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No. 92

January, 1968

RESOURCE MANAGEMENT REPORT

ONTARIO

DEPARTMENT OF LANDS AND FORESTS

HON. RENE BRUNELLE
Minister

G.H.U. BAYLY
Deputy Minister

No. 92 January, 1968

RESOURCE MANAGEMENT REPORT

FISH AND WILDLIFE BRANCH

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WATERFOWL BANDING IN ONTARIO

by
J.B. Dawson

Abstract

Yearly summaries of waterfowl banded in Ontario from 1918 to 1967 are presented by forest district and location. The purpose of banding, present needs, band recoveries, and future banding operations are discussed.

The number of waterfowl banded in Ontario has increased significantly during the past six years; 1,375 were banded in 1962, 12,751 in 1967. Blacks, woodducks and mallards currently are the three "prime target" species for banding; banding quotas for these species currently are 8,000, 1,200 and 2,000 respectively. Increased effort and changes in present banding methods will be required if quotas are to be reached.

Introduction

The annual banding of waterfowl is becoming a most important facet of waterfowl management. For several important species of ducks in eastern Canada, pre-season banding is the only technique which will provide data on mortality rates. This information is essential for accurate evaluation of harvest regulations.

The role of the Department in banding has changed considerably in recent years. Although banding by Department personnel started in 1950, and several stations have operated nearly every year since 1955, (as recently as 1961) only three Department-run stations were operated.

The past six years has seen a greatly expanded banding effort by this Department. The number of stations operated by Department personnel increased to 20 and 22 in 1966 and 1967 respectively. This increase relates in part, to a southern Ontario woodduck banding goal of 500 birds annually set by the Department in 1962, and to the establishment of a cooperative banding program in eastern Canada by the Atlantic Flyway Council. Much of the stimulus to band larger numbers of ducks has come from a greater appreciation of banding needs and values and a desire to obtain answers to important management problems.

This report is designed to summarize provincial waterfowl banding accomplishments; to indicate how banding contributes to the management program; to outline banding problems and procedures; and to indicate future requirements.

Banding in Ontario, 1918-1967

Bird banding on this continent commenced over 50 years ago; its original purpose was to find out the travel routes of migratory birds. In the early years, a wide variety of migratory birds were banded, principally by amateurs, more or less indiscriminately. The results of such programs sufficed to determine migration routes of several important species and provided a basis for establishing the four waterfowl flyways now recognized in North America.

Records of waterfowl banding contained in Tables 1 to 7 (Appendices 1 to 7) were taken from old files, the Maple library, and from summaries provided in recent years by the Canadian Wildlife Service and the banding committee of the Cooperative Banding Program in eastern Canada. Most of these records relate to late summer and autumn pre-season bandings.

Records for the years prior to 1963 (particularly the years 1955-62) may not be complete, since summaries for all years are not available either from the Canadian Wildlife Service or the Migratory Bird Population Station at Patuxent. Few stations operated prior to 1963, however, and most have been listed, some only by location. All major stations in operation since 1964 have been listed although small numbers of waterfowl banded by amateurs are not included, except for the years 1962 and 1964.

The only banding of significance prior to 1950 was done by Mr. H.S. Osler from 1918 to 1926 at his large marsh situated on eastern Lake Scugog in Ontario and Durham Counties. The 4042 black ducks banded by Osler apparently exceeded the total numbers of that species banded prior to the 1918-26 period.[1]

One of the earliest banding stations run by Lands and Forests personnel was established near LaVallee in Rainy River District in 1950. That same year, C.O. Bartlett, biologist with the Fish and Wildlife Division, banded 852 ducks, principally blacks, on James Bay.

Discussions were held in the early fifties between Federal (U.S. and Canada), State and Provincial authorities with respect to possible cooperative banding efforts in southern Ontario. These discussions led to the establishment of stations at Ottawa, Lake Scugog

[1] Lumsden, H.G. pers. com.

and Amherst Island in 1954. These were run by personnel of the New York Conservation Department assisted by Lands and Forests staff and students from the Ontario Agricultural College.

During the fifties, Department banding was curtailed by budget limitations and perhaps also by uncertainty as to banding needs and responsibilities.

Participation by Ontario representatives at technical sessions of the Atlantic Flyway Council led to an expanded banding program starting in 1962 which was designed to capture at least 500 woodducks annually in southern Ontario.

The Atlantic Flyway's Cooperative Banding Program, instituted in 1965, also increased banding efforts in Eastern Canada. The U.S. Fish and Wildlife Service, the Canadian Wildlife Service, and the Provinces from Ontario east contribute personnel and operational funds. These annual expenditures have been more than double that incurred by cooperating States.

During the 1962-67 period, expenditures for banding by this Department exceeded $10,000 annually and reached almost $15,000 in 1966. About $9,000 and $3,000 of this latter total was permanent and casual staff salaries respectively; the remainder was cost of maintenance and operation. Costs are discussed further in a later section. (See Table 11, Appendix 8)

Pre-season banding also is carried out in the U.S., particularly in northern States of the flyway. Table 8 below shows that recent U.S. bandings totalled only slightly fewer than those in Canada. The northern states of New York, Maine and Massachusetts contributed the largest number of bandings to the U.S. total.

A considerable amount of credit for Ontario duck banding is due non-government banders. Private individuals and organizations such as the Oshawa and District Sportsmen, the Ontario Bird Banders Association, and the University of Guelph have contributed substantially to the banding program in recent years.

Table 8

Pre-season Duck Bandings - Atlantic Flyway 1967

	Mallard	Black	Woodduck	Other	Total
Ontario	5218	2761	397	4375	12751
Quebec	297	915	115	1314	2641
Maritime Provinces	26	1582	156	2082	3846
Total Eastern Canada	5541	5258	668	7771	19238
Fourteen Atlantic States	7041	4347	3293	3123	17804
Total Atlantic Flyway	12582	9605	3961	10894	37042

Table 9 below summarizes duck banding by species in Ontario for the years 1960 through 1967. During this period total bandings have increased from 405 to 12751; Lands and Forests bandings have increased from 235 to 5206.

Table 9

Waterfowl Banded by Species in Ontario

1960 - 1967

	Year							
Species	1960	1961	1962	1963	1964	1965	1966	1967
Black	205	505	1160	1276	1646	1824	2055	2761
Woodduck	5	10	373	498	309	341	808	397
Mallard	155	768	1445	1741	2502	4547	4032	5218
B.W. Teal	13	31	535	1259	2210	4597	4854	2483
G.W. Teal	28	17	110	200	98	84	380	380
Other	4	44	163	350	261	874	732	1512
Total	405	1375	3786	5324	7026	12267	12861	12751
Banded by Lands & Forests	235	322	486	2146	5162	3351	5476	5206

The banding of geese in Ontario has not been given high priority to date but Canada geese have been banded almost annually since 1959 on the Lake St. Lawrence management unit. A team from Illinois and Missouri banded nearly one hundred Canadas in Sioux Lookout district in the late fifties, but no specific records are available.

Why Band Waterfowl?

Early waterfowl banding delineated migration routes and provided a basis for the flyway concept.

Since the early nineteen-fifties, waterfowl banding has taken on new meaning; continental banding programs now play a significant role in research and management. Duck banding is of

particular importance in the Atlantic Flyway. Unlike the open prairie "duck factories" of the west, the heavily wooded breeding grounds of such species as the black and woodduck makes inventory of breeding pairs or broods not only impractical but well nigh impossible. Pre-season banding is the only reliable method of obtaining vital statistics concerning these species.

Since 1966, the Federal Migratory Game Bird Hunting Permit has made waterfowl harvest and wing collection surveys possible. These will permit more highly sophisticated analyses of Canadian banding data. For instance, information on bands as reported by mail questionnaires or wing collections can be used to determine Canadian band reporting rates (the percentage of bands recovered by hunters which are reported to the banding office).[1] One method which can be used in obtaining these data is shown in Appendix 9.

Banding data provide the basis for solving many problems important to management.

A partial list of these, with explanation in brief, follows.

1. Evaluation of Regulations

The effect of changes in harvest regulations can be measured by noting changes in band recovery rates. Hunting mortality, at least for some species, is additive. U.S. Fish and Wildlife Service biologists have shown the relationship between hunting pressure (first year recovery rate) and annual mortality rate of young black ducks by the graph illustrated in Figure 1. There appears to be a straight line relationship between first year recovery rates and annual mortality rates.

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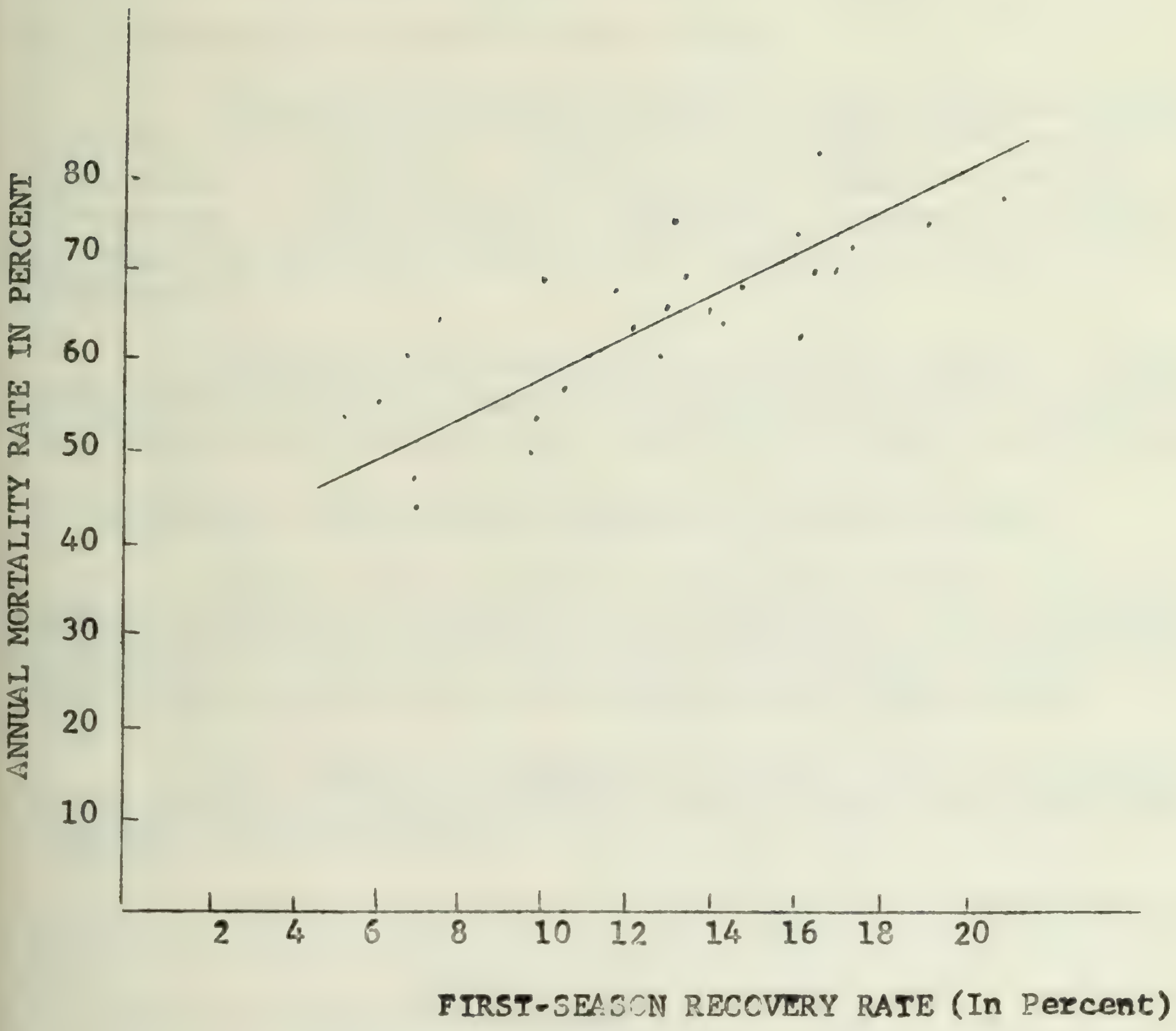
[1] For definition of terms, see Appendix 8

Fig. I

Relationship Between the First Hunting Season Recovery Rates and Mortality Rates of Immature Black Ducks Banded Between 1946 and 1959[1]



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[1] Adapted from Addy (1966)

2. Distribution of the Kill Relating to Various Breeding or Wintering Populations

Knowledge of harvest areas influenced by various production areas is important management information. Similarly, the distribution of the kill for wintering populations is important, particularly for Canada geese. Certain discrete populations may have unique characteristics. For instance, a wintering population of under-harvested black ducks (discovered through banding) has led to an extension in the season in a restricted area on the Atlantic coast.

3. Vulnerability Related to Age or Sex

Immatures are more vulnerable to the gun than adults; recovery rates provide a measure of the degree of vulnerability. This information is needed if age ratios as determined from wing collection surveys are to reflect annual production accurately. Annual productivity rates are required if mortality rates are to be correctly interpreted.

Distorted sex ratios often occur in the kill. Band recovery information helps to explain the reasons behind such distortions (intentional or unintentional selection by hunters can be responsible).

4. Variations in Shooting Pressure on Various Species

Band recovery rates can show the gunning pressure to which various species are exposed. This information has led to early teal seasons in the U.S., to bonus scaup and goldeneye regulations and to restrictions on the harvest of redheads and canvasbacks.

The "species management" concept, which undoubtedly will be practised on a wider scale in future years, will rely heavily on analyses of banding data.

Banding information is most helpful in indicating population trends.

5. Mortality and Survival Rates

Several approaches to the calculation of mortality rates are available. Two, the "Simple Dynamic" and the "Time Specific", are used to calculate mortality from a single banding season. More generally, data from a series of bandings are used in a "Composite Dynamic" method. For a detailed description of mortality rate determination and its uses, see "Measuring Hunting and Other Mortality" written by A.D. Geis and R. Taber in Chapter 11 of Wildlife Investigational Techniques, Second Edition, The Wildlife Society, 1963. (every District should have this manual in its library)

The above are the main uses for banding data. They also provide the basis for a better understanding of many waterfowl characteristics, including longevity, breeding age, territorality, renesting and fidelity to migration and wintering areas.

Analysis of Banding Data

All banding information is stored at the Migratory Bird Population Station at Patuxent. These data are available to Federal, State and Provincial personnel and other waterfowl workers who wish to obtain answers to specific questions. Most banding analysis has been done by Bureau personnel at Patuxent. Some studies require techniques of considerable sophistication and biologists at Patuxent frequently spend a high proportion of their time working with banding data.

Frequently, returns from several years are required to provide sufficient information for analysis. In this regard, better data are becoming available as a result of the greatly expanded banding operations in eastern Canada. The U.S. Bureau of Sports Fisheries and Wildlife has published or has in press, thirteen administrative reports based upon recent banding information. Titles are as follows:

1. Adm. Rep. 101. 1965 Summer and Pre-season Banding of Mallards, Black Ducks, Wood Ducks and Blue-winged Teal.

2. Adm. Rep. 107. Comparisons of 1964 and 1965 First-hunting-season Recovery Rates for Mallards, Black Ducks and Pintails.

3. Adm. Rep. 110. Mallard and Black Duck Sex Ratios in the Hunting Kill, 1962-65.

4. Adm. Rep. 111. Age Ratios of Some Important Duck Species Killed During the 1965-66 Hunting Season Compared with Those of Prior Years.

5. Adm. Rep. 114. Band Recovery Data (1965) and Pre-season Population Estimates for Wood Ducks (1960-65).

6. Adm. Rep. 117. First-hunting-season Recovery Rates, Distribution of the Kill and Derivation of the Kill for Blue-winged Teal Banded During Summer, 1965.

7. Adm. Rep. 134. Mallard and Black Duck Sex Ratios in the Hunting Kill, 1963-66.

8. Adm. Rep. 135. Age Ratios of Some Important Duck Species Killed During the 1966-67 Hunting Season Compared with Those of Prior Years.

9. Adm. Rep. 137. Wood Duck Band Recovery Data for 1966 and Pre-season Population Estimates, 1961-65.

10. Adm. Rep. 140. 1966-67 Experimental Late Black Duck Season in Maine, New Hampshire and Massachusetts.

11. Adm. Rep. 141. First-hunting-season Recovery Rates of Mallards Banded During Winter, Summer and Early Fall, 1966.

12. In Press. First-hunting-season Recovery Rates of Black Ducks Banded During the Winter, Summer and Early Fall, 1966.

13. In Press. First-hunting-season Recovery Rates, Distribution of the Kill and Derivation of the Kill for Blue-winged Teal Banded During the Summer, 1966.

Some districts may be receiving the above reports from Patuxent; all published reports are available from the Fish and Wildlife library at Maple.

Recent band recovery data have been used to good effect in other studies. Of particular interest is the recent monograph entitled "The Green-winged Teal; Its Distribution, Migration and Population Dynamics", by Gaston Moisan of Laval University. This publication can be borrowed from the Maple library or purchased from the Superintendent of Documents, U.S. Government Printing Office, Washington, D.C., at a cost of $1.25.

Some districts, including Gogama, Port Arthur and Kapuskasing, have done commendable work in summarizing band recovery information. All districts, where banding has been carried out under a Lands and Forests permittee, should maintain a permanent filing system for banding and band recovery information and have it available for analysis on either a district or provincial basis.

Currently, the Migratory Bird Population Station is switching to a much larger computer. The station has been running much behind schedule in band return reporting. However, the new equipment is expected to provide much faster service.

The Canadian Wildlife Service plans to maintain at Ottawa, duplicate records of all birds banded in Canada, and is establishing the necessary machinery to do so. All enquiries pertaining to Canadian banding then will be serviced from Ottawa.

Band recovery cards currently are sent by Patuxent to the permittee under whose name the banding was done. Where this involved district staff, districts can maintain permanent records of bandings

and returns; where banding was done by other permittees, such information is not available. It would be valuable to have at least some of these records on file, either on a district or provincial basis; this possibility will be discussed at the next Atlantic Flyway Technical Session.

Ontario Waterfowl Banding Needs

What is the future of waterfowl banding in Ontario? Flyway biologists, following an assessment of the data available, have summarized banding needs by species, time of year and area. Their recommendations follow.

Banding produces the best result if carried out either on the breeding or wintering grounds. The banding of birds during migration is generally not recommended, although pre-season bandings on staging areas in northern areas is acceptable. In Ontario, most value will accrue from pre-season banding. In particular instances, in-season banding may be approved. Quotas set for various areas are based upon: particular requirements for various species; a compromise between the minimum amount of data required and the maximum amount of banding considered practical (over banding may result in loss of interest in band reporting); and a target of 200 direct recoveries per species from each banding zone.

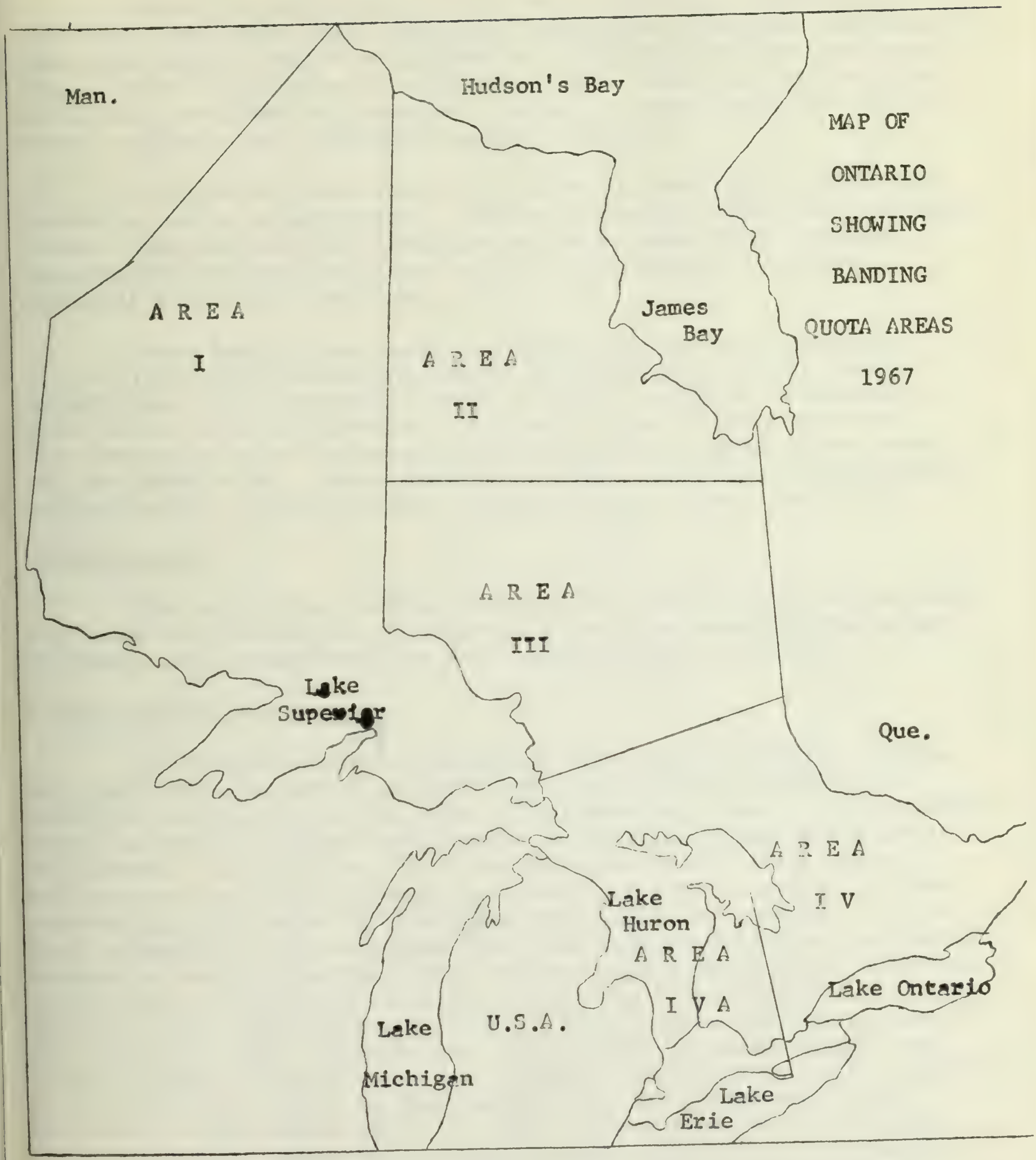
Table 10 outlines pre-season banding quotas as of January 1, 1967. Areas are outlined in Figure 2.

Table 10 1967 Pre-season Duck Banding Quotas and Number Banded 1965-67

Quota Area*	QUOTA			NUMBER BANDED								
	Blacks	Mallards	Woodducks	Blacks			Mallards			Woodducks		
				1965	1966	1967	1965	1966	1967	1965	1966	1967
Area I - Western Region West of Lake Nipigon	1000	1000		476	252	282	620	309	347			
Area II - Western James Bay	1000					118						
Area III - North Central Ontario	2000			667	346	593						
Area IV - South Central Eastern Ontario	2000		900	237	1185	1148				206	670	293
Area IVA - South Western Ontario	2000	1000	300	427	272	547	3382	905	2030	93	78	99
TOTAL	8000	2000	1200	1807	2055	2688	4002	1214	2377	299	748	392

*See Figure 2

Figure 2


Man.
Hudson's Bay
MAP OF
ONTARIO
SHOWING
BANDING
QUOTA AREAS
1967
AREA
I
AREA
II
James
Bay
AREA
III
Lake
Superior
Que.
AREA
IV
Lake
Huron
AREA
IVA
Lake Ontario
Lake
Michigan
U.S.A.
Lake
Erie

Blacks, mallards and woodducks are the three species for which pre-season Ontario banding quotas have been set.

Quotas for other species are not a practical consideration at this time, but these ducks should be banded when captured. Banding of non-quota species should be limited to 1,000 birds or less per quota area. Table 10 indicates that present quotas have been met only for mallards in southwestern Ontario. Indeed, in two of the last three years, mallards have been over-banded in area 4A.

Considerable improvement is needed if quotas for blacks and woodducks are to be approached. Shifts in banding effort are required; several stations will be eliminated or their operations modified; co-operative banding funds then will be made available to more strategically located stations.

Goose banding has been co-ordinated by various committees of the Flyway Councils and no quotas have been set by U.S. Federal authorities. On a Provincial basis there is a need to band Canada geese in the Lake St. Lawrence area, and to band lesser snows on Cape Henrietta Maria on James and Hudson Bays. No quotas have been set for these areas. Goose banding is under discussion by technical representatives of both Ontario and Mississippi flyway councils.

Winter Banding

The only winter banding outlined for Ontario is 2,000 redheads and 2,000 canvasbacks for the Detroit River area between Ontario and Michigan. No arrangements for such banding have been made.

Future Banding Arrangements

All districts should carefully assess their wildlife program and should plan to band waterfowl where the required species are available and banding can be done at an acceptable cost. All locations which can produce 200 or more blacks, or 50 or more woodducks should be operated. In addition, there are many locations where lesser, but important numbers of blacks and woodducks can be trapped. These sources must be trapped if banding quotas are to be reached. In the past, permanent staff sometimes have been engaged full-time for lengthy periods on banding stations which produce only a few birds. For these situations, a "trapline" of bait stations can be maintained by casual employees, who keep the traps baited. Traps can be kept open, except for one or two days per week when the qualified operator bands the ducks captured. Larger traps are sometimes useful under such a system. Much better use is made of the banders time and interested local residents, often school boys, can earn a few dollars by baiting and "closing" traps. Under this system banding costs should be greatly reduced; the number of ducks banded should compare favourably with

numbers taken during daily banding operations. The problem of daily recaptures ("trap-happy" ducks) also will be reduced.

The cost of bait usually is a minor proportion of total banding costs. To attract ducks in good numbers, liberal amounts of bait should be used in prebaiting. Bait should also be used to evaluate the potential of new sites.

Migratory bird banding permits are issued by the Canadian Wildlife Service, 400 Laurier Ave. W., Ottawa. Applications for permits should be made in the District Forester's name.

Every district which bands migratory birds should have a Bird Banding Manual, available from the Canadian Wildlife Service; procedures to be followed in banding are outlined in detail.

Banding schedules should not be forwarded to Maple. They should be forwarded in duplicate to the Canadian Wildlife Service at the above noted address.

The report for the Atlantic Flyways Cooperative Banding Project should be sent to C.E. Addy, Atlantic Flyway technical representative, Migratory Bird Population Station, Laurel, Maryland, as soon as possible after the banding season. A duplicate copy should be sent to Fish and Wildlife Branch at Maple. Banding recovery cards sent from Patuxent should be kept on permanent files in the district office.

Most districts which have operated banding stations have budgetted accordingly. Some co-operative banding funds also have been available for the past three years; the co-operative program has been approved again for the period 1968-1970. Game section has been allocating these funds on the basis of need, and availability of monies from Fish and Wildlife Branch allocations. For the past three years approximately $1,500 in Co-operative funds has been used annually on Lands and Forests banding operations. This amount may be increased substantially in 1968.

Banding Waterfowl can be Expensive

Many factors influence banding costs. These include availability of birds, (which may vary widely from one year to another) access, water levels, control of predators, and weather conditions. The most inexpensive banding results from large numbers of accessible (and co-operative) birds. Decisions respecting continued operation of stations will be based, in part, on costs per bird banded. Higher costs can be tolerated if banding of important species results.

Table 11, Appendix 8, outlines banding costs for Ontario stations operating in 1966. Stations where unpaid volunteer labour

was available, (e.g. Long Point Observatory), produced very low-cost banding. A cost per duck banded of between one and two dollars is a reasonable target at which all banders should aim.

Banding Techniques

Most banding in Ontario has been done using conventional, grain-baited, confusion-entrance wire traps. C.E. Addy outlines most of the proven trapping techniques in "A Guide to Waterfowl Banding", published by the U.S. Fish and Wildlife Service in 1956. (Maple library) Addy also includes suggestions on trapping in his annual memorandum to those participating in the Co-operative Banding Program in Eastern Canada.

In recent years, capturing waterfowl by night lighting has produced reasonably good results, although some prime banding targets such as the black duck have not constituted a large proportion of the catch. Two U.S. Fish and Wildlife Service air boats operated in north-eastern and central Ontario last summer; one was used the year previously.

These night lighting craft can be used only in bigger waters. Smaller night lighting units such as canoes or small skiffs may prove even more effective on rivers, creeks and smaller marshes. A paper outlining this latter technique was presented at the last Northeastern Wildlife Conference; the author has been asked to supply details. This information then will be forwarded to all districts.

Recoveries of Banded Waterfowl

It is most important that banding returns be unbiased. Advertising campaigns (radio stations - Chambers of Commerce etc.,) have on occasion made the analysis of local recovery data most difficult, since it is impossible to evaluate changes in reporting rates. Unless every hunter on the continent can be reached by advertising, requests to them for bands will produce an unmeasurable bias.

In the past, many Department employees collected and forwarded waterfowl bands to Washington. Particularly misleading are band returns which have been systematically collected at major kill areas such as public hunting grounds or large public marshes.

When hunters are checked they should be advised to send bands to Washington, if they ask advice concerning the band. It should be made clear that we are interested in the band, but that it is necessary for the hunter to send the band in himself.

Efforts to collect all bands taken by Indians on James and Hudson Bays should continue. A very high proportion of bands have been made available by Indian hunters in the past; those analyzing the data have been made aware of this, and it is desirable to maintain continuity in this program.

It is possible to band too many waterfowl. Over banding can affect reporting rates. If banded birds are frequently taken by hunters, particularly in local areas, the novelty of forwarding bands to Washington soon wears off and reporting rates fall. For this reason, it is important that we restrict banding to the quotas which have been set. Also, it is desirable to band birds in areas which are not heavily hunted. This is difficult to accomplish, since most fall concentration points are open to hunting. Banding is of greatest value, however, when banded birds are given the opportunity to mix with unbanded segments of the population before hunting takes place.

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Table 1 Pre-season Waterfowl Banding in Ontario 1918-1961 Appendix I

Year	District & Location	Crew Leader & Agency	Black	Mallard	Wood-duck	B.W. Teal	G.W. Teal	Other	Canada Geese	TOTAL
1918-26	LAKE SIMCOE Lake Scugog	Osler - Private	4042	117				266		4425
1950	FORT FRANCES LaVallee	Gray - L&F		193				?		193+
	COCHRANE Big Piskwanish Pt.	Bartlett - L&F	507	68			9	268		852
1954	LAKE SIMCOE Oshawa	Parker - New York	580	244				219+		1043+
	Toronto Islands	Stephen - U. of G. & Toronto A. & H.								158
	TWEED Amherst Island	Schierbaum - New York	38	60				?		98+
	Prince Edward Cty.	Schierbaum - New York	122	82						204
	COCHRANE James Bay	Buckalew - U.S.F.W.	507	93				168		768
1955	LAKE SIMCOE Oshawa	Parker - New York, L&F, Toronto A. & H.								?
	Lake Scugog	Parker *et. al.*								?
	LAKE HURON Niska	deVos - U. of G.	327	136				4		467
1956	LAKE HURON Niska	deVos - U. of G.	50	17				5		72
	LAKE SIMCOE Oshawa	Bennett - Oshawa & District Sportsmen	572	141	22	256	27	31		1049
	GOGAMA Halliday Lake	Baker - U.S.F.W.	448	11			2	2		463
1957	LAKE SIMCOE Oshawa	Bennett - Oshawa & District Sportsmen	558	226	29	207	14	47		1081
	GOGAMA Halliday Lake	L&F	192	11	1		1			205
1958	LAKE SIMCOE Oshawa	Oshawa & District Sportsmen	590	252	23	96	49	27		1037
	Secords Pond (1958?)								24	24
	TWEED Prince Edward Cty.	Cringan - U. of G.	7	1	17	3				28
	GOGAMA Halliday Lake	Macfie - L&F	269	11		2	1	2		285

Table I Pre-season Waterfowl Banding in Ontario 1918-1961 (Cont'd) Appendix I

Year	District & Location	Crew Leader & Agency	Black	Mallard	Wood-duck	B.W. Teal	G.W. Teal	Other	Canada Geese *	TOTAL
1959	LAKE SIMCOE									
	Oshawa	Bennett - Oshawa & District Sportsmen	605	234	21	208	49	79		1196
	KEMPTVILLE									
	Nairn Island	Dawson - L&F							62	62
	PEMBROKE									
	Hatchery-Mud Lake	Catton - L&F	85	6	10					101
	GOGAMA									
	Halliday Lake	Culliton - L&F	198							198
	GERALDTON									
	Arm Lake	L&F	28	18						46
1960	LAKE SIMCOE									
	Oshawa	Bennett - Oshawa & District Sportsmen	287	157	41	736	31	112		1364
	LAKE HURON									
	Niska	Cringan - U. of G.	25	141				4		170
	GOGAMA									
	Halliday Lake	Stone - L&F	159	5		1				165
	GERALDTON									
	Arm Lake	Kodila - L&F	21	9		12	28			70
1961	LAKE SIMCOE									
	Oshawa	Bennett - Oshawa & District Sportsmen	439	298	72	651	334	66		1860
	LAKE HURON									
	Niska	Cringan - U. of G.	79	177	3	6		23		288
	Luther	Cringan - U. of G.	226	421	7	15		14		683
	Galt	Cringan - U. of G.	27	121						148
	KEMPTVILLE									
	Nairn Island	Gawley - L&F							66	66
	GOGAMA									
	Halliday Lake	Johanson - L&F	108	4						112
	GERALDTON									
	Arm Lake	Kodila - L&F	65	45		10	17	7		144
		TOTAL	11161	3299	245	2203	562	1345	152	19125

U. of G. - University of Guelph

L&F - Lands and Forests (Ontario)

U.S.F.W. - United States Fish and Wildlife Service

* 151 brant were taken by cannon trap and banded by Mantle, North Bay - 1961

Table 2 Pre-season Waterfowl Banding in Ontario - 1962 Appendix 2

District & Location	Crew Leader & Agency	Black	Mallard	Wood-duck	B.W. Teal	G.W. Teal	Other	Canada Geese	TOTAL
LAKE ERIE									
Long Point	Cringan - U. of G.		30						30
Long Point	Hussell - O.B.B.A.	58	145	43	9	2	2		259
Elgin Cty.	Jones - Private	55	45						100
LAKE HURON									
Dufferin & Wellington Cties.	Cringan - U. of G.	154	661	3	64	2	29	6	919
York County	Page - O.B.B.A.	13	29				2		44
LAKE SIMCOE									
Hanlans Point	Dennis - T.N.S.S.		4				1	24	29
City Toronto & Algonquin Park*	Lowther - Private	70	136	2			19		227
Horning Mills	Marshall - Private			62					62
Oshawa	Kroll - Oshawa & District Sportsmen	472	339	84	420	106	39		1460
LINDSAY									
Nogies Creek	Dimsdale - L&F	4		100					104
KEMPTVILLE									
Lake St. Lawrence	McLeod - L&F							36	36
PEMBROKE									
Mud Lake	Catton - L&F	1	1	79	2				83
GOGAMA									
Halliday Lake	Carmichael - L&F	246	15				2		263
COCHRANE									
Several locations	Buckalew - U.S.F.W.	82	40		40		3		165
Other		5							5
	TOTAL	1160	1445	373	535	110	97	66	3786

*Banded in January and February

L&F - Lands and Forests (Ontario)

O.B.B.A. - Ontario Bird Banders Association

U. of G. - University of Guelph

U.S.F.W. - United States Fish and Wildlife Service

T.N.S.S. - Toronto Natural Science School

Table 3 Pre-season Waterfowl Banding in Ontario - 1963 Appendix 3

District & Location	Crew Leader & Agency	Black	Mallard	Wood-duck	B.W. Teal	G.W. Teal	Other	Canada Geese	TOTAL
LAKE ERIE									
Elgin Cty.	Field - O.B.B.A.	64	86	27	22	8	4		211
Long Point	Wasserfall - O.B.B.A. & L&F	57	200	105	684	10	6		1062
Welland	Folemsbee - O.B.B.A.	73	3		1		7		84
LAKE HURON									
Wentworth Cty.	Miles - O.B.B.A.	1	40	24			1		66
Wellington & Brant Cty.	Cringan - U. of G.	68	436	1	41	1	23		570
LAKE SIMCOE									
Toronto Islands	Dennis - T.N.S.S.	27	164		1		8	17	217
Oshawa	Kroll - Oshawa & District Sportsmen	428	296	161	359	150	158		1552
Five locations	Dorland - L&F			66					66
LINDSAY									
Nogies Creek	McKenzie - L&F	4		71					75
Northumberland Cty.	Bunker - Private	4	15	5					24
TWEED									
Lennox & Addington Cty.	Bittle - L&F	33	39	1	33	6			112
KEMPTVILLE									
Nairn Island	McLeod - L&F							99	99
PEMBROKE									
Muskrat Lake	Catton - L&F			5					5
PARRY SOUND									
Four locations	Douglas - L&F	67	10	29	1		2		109
SUDBURY									
Mud Lake	Pepper & Conroy - L&F	55	12	2	20	20			109
GOGAMA									
Halliday Lake	Gawley - L&F	229	19				1		249
GERALDTON									
Arm Lake	Gibson - L&F	144	59		2	1	20		226
FORT FRANCES									
Mathieu Estate	Buckalew - U.S.F.W.	10	336	1	79	4	2		432
Mathieu Estate	Pearson - L&F	1	23		10				34
OTHER									
Several locations	Private Banders	11	3		6		2		22
	TOTAL	1276	1741	498	1259	200	234	116	5324

T.N.S.S. - Toronto Natural Science School
O.B.B.A. - Ontario Bird Banders Association
U. of G. - University of Guelph
U.S.F.W. - United States Fish and Wildlife Service

Table 4 Pre-season Waterfowl Banding in Ontario - 1964 Appendix 4

District & Location	Crew Leader & Agency	Black	Mallard	Wood-duck	B.W. Teal	G.W. Teal	Other	Canada Geese	TOTAL
LAKE ERIE									
Elgin Cty.	Field - O.B.B.A.	69	137			1	1		208
Long Point Observ.	Hussell - O.B.B.A.	8	107				44		159
Long Point	Field - O.B.B.A. & L&F	54	440	64	1707	5	2		2272
Lake Erie	L&F				188				188
Yarmouth Twp.	Field - O.B.B.A.	20	132	28					180
Rondeau	Field - O.B.B.A.				190	1			191
LAKE HURON									
Wellington, Brant, Dufferin Cties.	Cringan - U. of G.	83	388				49	20	540
Wellington	Folemsbee - O.B.B.A.	5	42						47
LAKE SIMCOE									
Horning Mills	Marshall - Private			19					19
Hanlans Point	Dennis - T.N.S.S.	20	123						143
LINDSAY									
Nogies Creek	L&F			85					85
TWEED									
Hastings, Lennox & Addington Cties.	Bittle - L&F	150	35	43		1	3		232
KEMPTVILLE									
Lake St. Lawrence	McLeod - L&F							19	19
PEMBROKE									
Muskrat Lake	Catton - L&F	31	2	42	1				76
GOGAMA									
Halliday Lake	Gawley - L&F	130	15				6		151
SUDBURY									
Mud Lake (Laurentian)	Conroy & Pepper - L&F	155	150	3	20	51	3		382

Table 4 Pre-season Waterfowl Banding in Ontario - 1964 (Cont'd) Appendix 4

District & Location	Crew Leader & Agency	Black	Mallard	Wood-duck	B.W. Teal	G.W. Teal	Other	Canada Geese	TOTAL
COCHRANE									
Lillabelle Lake	Creighton - L&F	7	18		4	6			35
KAPUSKASING									
Pitukupi Lake	Hendry - L&F	246	215		1	3	16		481
GERALDTON									
Arm Lake	Gibson - L&F	143	141			3	26		313
PORT ARTHUR									
Port Arthur Harbour	Timmermann - L&F	453	127		22	7	11		620
Fort William	Story - Private	54	19				8		81
FORT FRANCES									
Mathieu Estate	Martin - L&F	10	392	20	64	3	7		496
OTHER									
Several	Private Banders	8	19	5	13	17	46		108
	TOTAL	1646	2502	309	2210	98	222	39	7026*

*Of this total, 199 were taken Jan. to Mar.; 225 from Apr. to June; 777 from Oct. to Dec. - the remainder was taken from July to Sept.

O.B.B.A. - Ontario Bird Banders Association
L&F - Lands and Forests (Ontario)
U. of G. - University of Guelph
T.N.S.S. - Toronto Natural Science School

Table 5 Pre-season Waterfowl Banding in Ontario - 1965 Appendix 5

District & Location	Crew Leader & Agency	Black	Mallard	Wood-duck	B.W. Teal	G.W. Teal	Other	Canada Geese	TOTAL
LAKE ERIE									
Long Point	O.B.B.A. & L&F	19	90	18	1553	2	254*		1936
Yarmouth Twp.	Field - O.B.B.A.		20	27	59	1			107
Dundas	Anderson - O.B.B.A.	2	18	43	7	8			78
Mud Lake	Folemsbee - O.B.B.A.		17		4		1		22
Lake St. Clair	Collins - C.W.S.	219	1963	1	2012		22		4217
LAKE HURON									
Luther	U. of G., L&F, U.S.F.W.	189	1292	48	81	1	86		1697
LAKE SIMCOE									
Five areas	Dorland - L&F, Orillia F&G Club	19	52	44	9		1		125
Oshawa	Kroll - Oshawa & District Sportsmen	173	141	65	447	21	12		859
LINDSAY									
Nogies Creek	Tuvi - L&F	2	13	98	15	7			135
TWEED									
Conroy Marsh	Bittle - L&F	24	9	3					36
Wolfe Island	Bittle - L&F	15	42				1		58
Thurlow Twp.	Bittle - L&F	21	69				2		92
KEMPTVILLE									
Lake St. Lawrence	McLeod - L&F							339	339
SWASTIKA									
Hills Lake	Gardner - L&F, U.S.F.W.	52	10		36		5		103
SUDBURY									
Mud Lake (Laurentian)	Young - L&F, U.of G.	54	46		26	10	3		139
GOGAMA									
Halliday Lake	Carmichael - L&F	241	28	3		2	4		278
COCHRANE									
Lillabelle Lake	Creighton - L&F	104	61	1			5		171
Porcupine Lake	Creighton - L&F	216	69	4	2	6	6		303
GERALDTON									
Arm Lake	Cook - L&F	25	24		4	7	54		114
PORT ARTHUR									
Port Arthur Harbour	Timmermann - L&F	440	257		229	7	10		943
FORT FRANCES									
Mathieu Estate	Martin - L&F	11	339	16	128	19	2		515
	TOTAL	1824	4547	341	4597	84	468	339	12267

*Includes 247 redhead ducks

Table 6 Pre-season Waterfowl Banding in Ontario - 1966 Appendix 6

District & Location	Crew Leader & Agency	Black	Mallard	Wood-duck	B.W. Teal	G.W. Teal	Other	Canada Geese	TOTAL
LAKE ERIE									
Long Point	Fox - L&F, O.B.B.A.	9	149	17	1404	121	4		1704
Long Point Observ.	Page - O.B.B.A.	4	17	15	15	1	1		53
Dundas	Anderson - O.B.B.A.	6	44	177	36	1	2		266
Yarmouth Twp.	Hubert - C.B.B.A.	35	77	44	13	3	1		173
Niagara	Folemsbee - O.B.B.A.	82	294		2		8		386
St. Thomas	Field - O.B.B.A.	3	37						40
Lake St. Clair	Goodwin - Big Point Club, C.W.S.	102	173		1698	5			1978
LAKE HURON									
Niska	Meeking - U. of G.	119	452	2		1	12		586
Luther	Badger - U.S.F.W., L&F, C.W.S.	186	829	19	367	19	119		1539
Beverly Twp.	Sinclair - U. of G.	21	201	55	27		4		308
LAKE SIMCOE									
Oshawa	Kroll - Oshawa & District Sportsmen	301	495	99	227	22	19		1163
Bass Lake	Woodrow - Orillia F&G Club	17	67	46			7		137
LINDSAY									
Presqu'ile	Margison - L&F	145	60		273	62	10		550
TWEED									
Thurlow Twp.	Bittle - L&F	10	67	1	2		2		82
Conroy Marsh	Diffendall - U.S.F.W.	25	5	1			13		44
Sidney Twp.	Bittle - L&F	28	228	1	2		2		261
KEMPTVILLE									
Lake St. Lawrence	McLeod - L&F	182	177	191				161	711
Wiltse Lake - Gananoque	Miller - L&F	85	133	22	168		3		411
PARRY SOUND									
Several locations	Douglas - L&F	25	23	60	8	3			119
SWASTIKA									
Hills Lake	Gardner - L&F	2	1		14				17

Table 6 Pre-season Waterfowl Banding in Ontario - 1966 (Cont'd) Appendix 6

District & Location	Crew Leader & Agency	Black	Mallard	Wood-duck	B.W. Teal	G.W. Teal	Other	Canada Geese	TOTAL
GOGAMA									
Halliday Lake	Gawley - L&F	123	9			3	2		137
WHITE RIVER									
Mozambic Lake	Harrison - L&F	17	3			1			21
COCHRANE									
Lillabelle Lake	Wolfe - L&F	49	22				2		73
Porcupine Lake	Barnett - L&F	109	39			2	32		182
KAPUSKASING									
Hay Creek	Catton - L&F	46	20		23	27	1		117
GERALDTON									
Arm Lake	L&F Staff	12	8		3				23
PORT ARTHUR									
Port Arthur Harbour	Timmermann - L&F	232	99		416	32	7		786
FORT FRANCES									
Mathieu Estate	Martin - L&F	8	202	57	10	3	2		282
AIR BOAT									
Six locations	Badger - U.S.F.W. & L&F	72	101	1	146	74	318		712
	TOTAL	2055	4032	808	4854	380	571*	161	12861

*Others includes ducks only: hybrids, ringnecks, goldeneye, hooded merganser, pintail, gadwall, widgeon, redhead, scoter, lesser scaup, canvasback, shoveller and ruddy duck.

O.B.B.A. - Ontario Bird Banders Association
L&F - Lands and Forests (Ontario)
C.W.S. - Canadian Wildlife Service
U. of G. - University of Guelph
U.S.F.W. - United States Fish and Wildlife Service

Table 7 Pre-season Waterfowl Banding in Ontario - 1967 Appendix 7

District & Location	Crew Leader & Agency	Black	Mallard	Wood-duck	B.W. Teal	G.W. Teal	Other	Canada Geese	TOTAL
LAKE ERIE									
Yarmouth & Malahide Twps.	Hubert - O.B.B.A.	4	11	16	94	5			130
Long Point	Fox - L&F & O.B.B.A.	3	145	24	116	11	2		301
St. Thomas	Field - O.B.B.A.	23	78	11			7		119
Lake St. Clair	Goodwin - C.W.S.	100	249		486	4	7		846
Niagara Falls	O.B.B.A.	49	257		9		10		325
LAKE HURON									
Niska	Sinclair - U. of G.	26	138	2	1	1	13		181
Mountsberg	Campbell - U. of G.	13	34	39	186	3	2		277
Luther	Pratt - U. of G.	378	1375	7	122	13	46		1941
Dundas	Anderson - O.B.B.A.	39	26	81	44	3	27		220
LAKE SIMCOE									
Tiny Marsh	Manley - L&F	10	11		25		2		48
Bass Lake	Orillia F&G Club	11	48	36		2	1	9	107
Oshawa	Kroll - Oshawa & District Sportsmen	627	1187	20	130	21	40		2025
LINDSAY									
Presqu'ile	Toole - L&F	76	70		115	7	34		302
TWEED									
Wolfe Island	Campbell - Private & L&F	1	4		88	3	1		97
Thurlow Twp.	Woodhouse - Private & L&F	96	92		143	10	1		342
KEMPTVILLE									
Nairn Island	McLeod - L&F	131	368	92	2		1	198	792
Lake Loyada and Gananoque	Miller - L&F	101	238	7	81		1		428
PARRY SOUND									
Four locations	Curtis; Sinclair; Rusk - L&F	7	4	57		1			69

Table 7 Pre-season Waterfowl Banding in Ontario - 1967 (Cont'd) Appendix 7

District & Location	Crew Leader & Agency	Black	Mallard	Wood-duck	B.W. Teal	G.W. Teal	Other	Canada Geese	TOTAL
GOGAMA									
Halliday Lake	Gawley - L&F	272	22		1		15		310
WHITE RIVER									
Three locations	Harrison - L&F	98	22			14	13		147
COCHRANE									
Big Piskwanish Pt.	Gardner; Wolfe - L&F	71	248		18	43	150*		530
Hannah Bay	Parker - U.S.F.W.	47	58		5	22	653*		785
Porcupine Lake	Barnett - L&F	103	48		1	7	8		167
KAPUSKASING									
Hay Creek	Catton - L&F	120	42		1	3	5		171
GERALDTON									
Arm Lake	Cook - L&F	33	13		1	6	17		70
PORT ARTHUR									
Port Arthur Harbour-Fort William	Timmermann - L&F	249	206		626	104	68		1253
FORT FRANCES									
Mathieu Estate	Stasus - L&F		128	3	16	31	1		179
AIR BOAT									
Several locations	Badger; Kirkland - U.S.F.W.	73	96	2	181	66	191		609
	TOTAL	2761	5218	397	2483	380	1316	206	12751

* 147 pintails taken at Big Piskwanish; 653 pintails taken at Hannah Bay

O.B.B.A. - Ontario Bird Banders Association
L&F - Lands and Forests (Ontario)
C.W.S. - Canadian Wildlife Service
U. of G. - University of Guelph
U.S.F.W. - United States Fish and Wildlife Service

Table 11

Ontario Pre-season Duck Banding Costs-Co-operative Banding Program 1966

Cost Estimates

Banding Station	Leader & Crew Salaries	Volunteer Labour	Subsistence	Equipment, Operation	Materials & Supplies	Total Cost	Total Birds	Cost per Bird
ONTARIO								
Niska (Guelph)	522	38		116		676	586	1.15
Oshawa	200			400		600	1,163	0.52
Luther Marsh	2,100		112	486	150	2,848	1,539	1.85
Beverly Twp.	420	76	32			528	308	1.71
Bass Lake							137	
Long Point	750	210	120	137		1,217	1,704	0.71
Long Point Observ.				16		16	53	0.30
Dundas				80		80	266	0.30
Yarmouth Twp.		20	18	66		104	173	0.60
Niagara				193		193	386	0.50
Pinafore Park							40	
Lake St. Clair	452			80		532	1,978	0.27
Arm Lake	935	158	12	187		1,292	23	56.17
Parry Sound	428	124		80		632	118	5.36
Conroy Marsh	1,400	480	95	175		2,150	44	48.86
Sidney Twp.	30	17	10	12		69	183	0.38
Presqu'ile	1,962	430		48		2,440	550	4.44
Mozambic Lake		160		189		295	21	14.05
Halliday Lake	1,160	350	305	125		1,940	137	14.16
Lillabelle Lake	317		14	55		336	73	5.29
Porcupine Lake	484	60	12	66		622	182	3.42
Kapuskasing	642	120	107	165		1,034	117	8.84
Hill-Kirkland Lakes							17	
Port Arthur	850	50		120		1,020	786	1.30
Fort Frances	500	125		40		665	282	2.36
Thurlow Twp.	35	38	35	30		138	82	1.68
Lake St. Lawrence	1,850	370	90	155		2,465	711	3.47
Wiltse Lake	315		40	200		555	411	1.35
Airboat (5 locations)	2,097	1,024	740	529		4,390	712	6.17
TOTAL	17,449	3,796	1,742	3,750	150	26,887	12,861	2.10

Appendix 8

Definition of Terms[1]

Population

A species collectively or segment thereof which, because of significant differences in kill distribution, mortality rate, etc., is considered as a separate population for study and/or management purposes.

Representative

The sample taken (as in banding and population surveys) is of such a size and distribution that it portrays accurately the characteristics of the population being studied.

Shooting Pressure

The degree to which a population is subjected to shooting as measured by the proportion of the population which dies as a result of being hunted. An index to shooting pressure is the recovery rate,

Recovery Rate

The percent of the banded birds recovered and reported to the Banding Office.

Reporting Rate

The percent of birds taken by hunters that are reported to the Banding Office.

Harvest Rate

The percent of the population that is harvested. This is the recovery rate divided by the reporting rate. (For example, if the recovery rate was 10 percent and half the banded birds taken were reported, the harvest rate would be 20 percent.) See Appendix 9.

Kill Rate

Recovery rate adjusted for crippling loss and non-report of bands. The proportion of the population dying as a result of hunting.

[1] Adapted from Addy (1966)

Mortality (or Death) Rate

Deaths within a population divided by the number of individuals in that population at the beginning of a time period. Percent of birds which died. Usually expressed as average annual rate of mortality or the mortality rate for any one year, usually first year mortality rate. Mortality rates also may be determined for portions of a year when required data are available. Usually expressed as a decimal fraction or as a percentage.

Non-hunting Mortality

Deaths due to causes other than a gun.

Survival Rate

The number remaining alive in a population divided by the number of individuals in that population at the beginning of a time period. Percent of birds which survived. (For example, if mortality is 60%, survival is 40%).

Appendix 9

One Method of Determining Band Reporting Rates Using Wing Survey Data[1]

Problem

Given:

Black duck bands reported to Banding Office = 5,000
Black duck kill = 200,000
Black duck wings = 8,000
Wings from banded black ducks = 400

$$\frac{\text{Total bands taken by hunters}}{\text{Total Kill}} = \frac{\text{Wings from banded ducks}}{\text{Total Wings received}}$$

$$\frac{\text{Total bands taken by hunters}}{200{,}000} = \frac{400}{8{,}000}$$

$$\text{Total bands taken by hunters} = \frac{200{,}000 \times 400}{8{,}000} = 200{,}000 \times .05 = 10{,}000$$

$$\text{Proportion of bands taken that are reported} = \frac{\text{Total number of bands reported to Banding Off.}}{\text{Total bands taken by hunters (from wing survey or mail questionnaire)}}$$

$$\text{Proportion of black duck bands taken that are reported} = \frac{5{,}000}{10{,}000}$$

$$= \underline{\underline{.50}}$$

A Method for Determining the Rate of Kill (Using black duck immatures)

Problem

Given:

12% recovery rate
50% reporting rate
Crippling loss is 30% of retrieved kill

$$\text{Rate of kill} = \frac{\text{Recovery rate}}{\text{Reporting rate}} + \text{Proportion of population shot but not retrieved}$$

$$= \frac{.12}{.50} + \left(.3 \times \frac{.12}{.50}\right)$$

$$= .24 + (.3 \times .24) = .24 + .07 = \underline{\underline{.31}}$$

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[1] Adapted from Addy, (1966)

WATERFOWL BANDING

COCHRANE FOREST DISTRICT

1967

by
M.R. Wolfe

Introduction

Waterfowl banding programs in the Cochrane District are conducted in co-operation with the Atlantic Flyway Co-operative Banding Program. The prime objective of this program is to band large numbers of Black Ducks and Wood Ducks but other species are also important.

Banding projects in the Cochrane District in 1967 included bait trapping at Big Piskwanish Point and Hannah Bay on James Bay; bait trapping at Porcupine Lake (near Timmins); and air boat banding at Porcupine Lake and Lillabelle Lake (near Cochrane).

The individuals in charge of each of these projects will submit detailed reports to the Banding committee. The purpose of this report is to summarize the information for the Cochrane District as a whole.

Summary of Projects

1. Hannah Bay

The bait trapping project in the Hannah Bay Bird Sanctuary was conducted by Bruce Parker of the U.S. Fish and Wildlife Service. Between August 17 and September 12, a total of 785 ducks were banded These included - 653 Pintails, 58 Mallards, 47 Black Ducks, 22 Green-winged Teal and 5 Blue-winged Teal.

Mr. Parker introduced one technique that may be useful to other Districts banding in inaccessible areas. This is the pre-baiting of ponds from the air by dropping 25 lb. bags of corn from aircraft. A large number of ponds can be baited in a short period and the bander can then select individual areas that the birds are using intensively.

2. Big Piskwanish Point

This bait-trapping project was a co-operative program of the Cochrane and Swastika Districts. Pre-baiting began on August 12; the first duck was caught on August 23 and the project was terminated on September 4. A total of 530 ducks were caught. These included 249 Mallards, 147 Pintails, 70 Black Ducks, 43 Green-winged Teal, 18 Blue-winged Teal, and 3 Mallard X Black Duck hybrids.

3. Bait Trapping - Porcupine Lake

The bait trapping project at Porcupine Lake was conducted by the Timmins Fish and Wildlife staff using the same methods as in 1965 and 1966. From August 23 to September 14 a total of 167 ducks were banded. These included 103 Black Ducks, 48 Mallards, 8 Widgeon, 7 Green-winged Teal and 1 Blue-winged Teal.

4. Air Boat Banding - Porcupine Lake

The U.S. Fish and Wildlife Service airboat was again operated in Northern Ontario by Leo Badger. In 4 nights operation on Porcupine Lake (August 14, 15, 17 & 18) a total of 278 ducks were caught. These consisted of 23 Black Ducks, 25 Mallards, 73 American Widgeon, 89 Blue-winged Teal, 63 Green-winged Teal, 2 Wood Ducks, 2 Ring-necked Ducks and 1 Common Merganser.

5. Air Boat Banding - Lillabelle Lake

On the nights of August 10, 11 and 12, the airboat crew banded 118 ducks on Lillabelle Lake. These included 38 Black Ducks, 29 Mallards, 23 Blue-winged Teal, 23 Lesser Scaup and 5 American Widgeon.

TOTAL CATCH FOR COCHRANE DISTRICT - 1967

Black Duck	- 281
Mallards	- 409
Pintail	- 800
Green-winged Teal	- 135
Blue-winged Teal	- 136
American Widgeon	- 86
Lesser Scaup	- 23
Black X Mallard	- 3
Wood Duck	- 2
Ring-necked Duck	- 2
Common Merganser	- 1
TOTAL	1,878

Discussion

1. James Bay

Bait trapping at James Bay was a successful venture insofar as trapping large numbers of ducks is concerned. However, the number of Black Ducks trapped was small.

While travelling by helicopter in the Piskwanish Point area on September 1st, the author observed approximately 5,000 Black Ducks on the tidal mud flats south of the point. Large flocks of Mallards, Pintail and Green-winged Teal were also present. Mr. Parker also reported large numbers of Black Ducks on the tidal flats in the vicinity of Hannah Bay. Parker's previous experience on James Bay and the Atlantic coast indicates that these salt flat and off-shore birds tend to be adults. They feed on the rich animal and vegetative life on the mud flats and seldom travel to the fresh water ponds where they can be baited with corn.

Both 1967 projects tend to confirm this theory. A total of 113 immature Black Ducks were caught and only 4 adults. In both cases large flocks of mud flat birds were present in the immediate vicinity. At Piskwanish Point the juvenile to adult ratio was high for all species caught.

In 1950 Charles Bartlett banded ducks at Big Piskwanish Point. (Bartlett, 1952). He banded a total of 852 ducks, including 504 Black Ducks. The age ratios of all species he caught ran high to adults, i.e. Black Duck 5:1, Mallard 2:1, Pintail 4.8:1. It is apparent that between 1950 and 1967 there has been a complete reversal of the age ratios of ducks on the freshwater ponds at Piskwanish Point. This can possibly be attributed to one of the following four factors:

(a) 1950 an extremely poor productivity year;

(b) adult birds are no longer using Piskwanish Point as a post-moulting concentration area;

(c) Bartlett was successful at trapping tidal flat birds;

(d) the ecology of the fresh-water marshes may have changed. ((c) and (d) may be related).

We have no evidence to support hypothesis (a) and (b). There were large numbers of tidal flat birds in the point area.

Hypothesis (d) is worth further consideration. 1967 was a relatively dry summer and there was practically no surface water on the general sedge marsh areas. The ponds were 6 to 12 inches deep at the beginning of the project and by the first of September at least one pond was almost dry. We do not have weather records for 1950 but Bartlett mentions that there were "numerous ponds and sloughs located between the ridges" that year. This year there were few ponds between the ridges and the sloughs were almost dry. If water levels had been higher, the marsh area probably would have been more attractive to ducks.

Bartlett's report states that "relatively warm weather occurred throughout the latter part of July and the month of August". He does not report whether there were any periods of strong north winds and high tides. In 1967 winds were from the south and west and tides were low throughout the banding period. The banding crew felt that strong north winds and high tides would have resulted in a considerably increased catch. North winds would have moved more birds down the coast and high tides would have moved birds from the mud flats to the inland ponds.

In consideration of the above, it is recommended that the Piskwanish Point be repeated in 1968 in order to determine if large numbers of Black Ducks can be banded when weather conditions are favourable.

The Hannah Bay project should be discontinued.

The ratio of Black Ducks to Mallards in the 1950 and 1967 catches is indicative of the increasing importance of Mallards in Northern Ontario. The most valid comparison is probably that between immature birds. In 1950 this ratio was 3.8 BD: 1 Mal. In 1967 it was 1 BD to 3.6 Mal. This change of species composition is comparable to that known to have occurred in Southern Ontario.

The banding of 10 Blue-winged Teal at Big Piskwanish Point and 5 at Hannah Bay may be evidence of a continuing expansion of range by this species. No Blue-winged Teal are included in Bartlett's report. Also, none of the reports in our limited library at Cochrane contain references to this species in the James Bay area. In 1963 the Indians killed one specimen at Cape Henrietta-Maria. They stated that they had never before seen such a bird. Other known observations include one bird shot at the mouth of the Kapiskau River in the fall of 1967 and birds observed by Harold Lumsden at Kinoje Lake in the spring of 1967.

As information collected at check stations and goose camps becomes more detailed, we hope to be better able to document the occurrence of this and other less common species.

2. Lillabelle and Porcupine Lakes

The airboat banding crew at Lillabelle and Porcupine Lakes successfully caught a large number of ducks but few of these were Black Ducks. More Black Ducks were caught by the one bait trapping station at Porcupine. As a means for banding numbers of a variety of species, the airboat cannot be surpassed, but it is not a successful technique for catching Black Ducks. We should like to see the airboat return next year because of the data it can provide on the harvest and hunting season distribution of several species nesting in this area. (i.e. Widgeon). However, if Black Ducks remain the target species in the Co-op program, airboat banding can probably not be justified here.

We have located a beaver pond west of Lillabelle Lake on which several hundred Black Ducks and Mallards concentrate during August. We intend to operate a bait trap on this pond in 1968 and one trap on Lillabelle Lake.

Bait trapping catches of Porcupine Lake have declined for the last two years. This may be related to the activities of the airboat or it may be a result of trapping at the same location for three years in a row. The project should be continued in the same manner in 19[illegible] to determine if catchew will continue to decline or if they will return to their former level.

3. Duck Band Recoveries

A summary of bird band recoveries reported to date is included as Table I. This table relates primarily to birds banded in 1964 and 1965. Very few recovery reports for birds banded in 1966 have been returned to date.

A total of 135 recoveries have been reported. Of the 97 birds (72%) reported from the Province of Ontario, 6[illegible] came from the Cochrane - Timmins area.

These figures may be somewhat biased since bird bands were collected at the Lillabelle Lake check stations prior to 1967. We feel that about [illegible] to [illegible] percent of the banded birds shot on Lillabelle Lake in 1964 and 1965 were checked by our staff and data submitted. No bands were collected in the Timmins area. We estimate that our band collecting activities resulted in the submission of approximately 15 recovery reports that would not otherwise have been reported.

The corrected totals would then be 54 bands from the Cochrane - Timmins area, 27 from other parts of Ontario and 33 from other Provinces and States. Ontario hunters reported 61% of the kill of birds banded in the Cochrane area. There are undoubtedly other biases involved in the above data. However, I believe that further investigation of these factors will only reaffirm that Ontario hunters are killing at least their fair share of ducks raised in this area.

The size of our recovery data sample is still too small to reveal much about the migration patterns of Cochrane ducks. It would appear that Black Ducks tend to travel down the Atlantic flyway and Mallards utilize both the Atlantic and Mississippi flyways in about equal numbers. The few recoveries of Blue-winged Teal indicate a wide dispersal of birds. Non-local band recoveries within Ontario have come from many locations but the only concentration of reports has been from Lake St. Clair and Western Lake Erie. Further analysis of migration patterns will have to await the receipt of recovery data from the larger samples of birds banded in 1966 and 1967.

Summary and Conclusions

A total of 1,870 ducks were banded at four stations in the Cochrane District in 1967. The Big Piskwanish Point project should be continued in 1968 but the Hannah Bay project should be dropped.

If available, the airport should operate again on Porcupine and Lillabelle Lakes. The bait trapping station on Porcupine Lake should continue and bait traps should be operated in the Lillabelle Lake area.

The ratio of Black Ducks to Mallards at Big Piskwanish Point has changed from 3.0:1 to 1.3:0 from 1950 to 1967. There is some evidence of pioneering of Blue-winged Teal in the James Bay area.

Band recovery reports to date indicate that Ontario hunters are accounting for approximately 60% of the kill of ducks banded in the Cochrane area.

Acknowledgements

Fish and Wildlife staff from Cochrane and Swastika Districts and agents of the U.S. Fish and Wildlife Service conducted the banding program on which this report is based. Project leaders were G. Barnett, S. Harris, J. Gardner, L. Badger, and B. Parker. Moosonee division staff assisted with the logistics for the James Bay projects.

Literature cited

Bartlett, C.O. (1952) Some Waterfowl Observations in the Cochrane District of Northern Ontario. Wildlife Management Report #3, April, 1952.

TABLE I BANDING RECOVERIES REPORTED TO DATE FROM PORCUPINE AND LILLABELLE BANDING

1.	Black Duck	Cochrane - Timmins	30	Other Ontario	16
		S. Carolina	3	New York	2
		Ohio	2	Indiana	1
		New Jersey	1	Illinois	1
		Tennessee	1	Massachusetts	1
		Delaware	1	Vermont	1
		Maryland	1		39
				Total	61
2.	Mallard	Cochrane-Timmins	28	Other Ontario	10
		New York	2	Michigan	2
		South Carolina	1	Illinois	1
		Vermont	1	Ohio	1
					32
				Total	46
3.	Mallard X Black Duck Hybrid	Nil			
4.	Blue-Winged Teal	Cochrane - Timmins	2	Other Ontario	1
		Quebec	2	Nova Scotia	1
		Bahamas	1	Tennessee	1
					5
				Total	8
5.	Green-winged Teal	Missouri	1	Total	1
6.	American Widgeon	Cochrane - Timmins	5	Other Ontario	1
		Minnesota	1	New York	2
		Unknown	1		7
				Total	10
7.	Shoveler	Wisconsin	1	Total	1
8.	Pintail	Nil			
9.	Wood Duck	Nil			
10.	Ring-necked Duck	Cochrane	3	Florida	1
		Vermont	1	New York	1
		Wisconsin	1		5
				Total	7
11.	Lesser Scaup	Nil			
12.	Hooded Merganser	Cochrane - Timmins	1	Total	1

OPENING DAY OF THE 1967 DUCK SEASON

TINY MARSH

by
R. Manley

Abstract

During opening day of the 1967 duck season in Tiny Marsh, Conservation Officers checked 58 hunters who hunted a total of 105 hours. The total kill was 102 ducks or 1.03 ducks per man-hour of hunting. The marsh is readily accessible by hunters from many points. Parking areas seemed to pose a small problem on the north and east side of the marsh.

Introduction

Tiny Marsh is an area presently being developed and managed into a Provincial Hunting Area by the Department of Lands and Forests. Since this is the first year of operation, an attempt was made to collect as much information as possible on the waterfowl kill, hunting pressure and the resulting problems that arose from the utilization of this area by hunters.

Tiny Marsh is located approximately 5 miles north of Elmvale, between the first and third concessions of Tiny Township and County Roads #29 and #6.

Waterfowl Harvest Opening Day

Table I - Species

Black	Mallard	G.W. Teal	B.W. Teal	Wood Duck	Pintail	Ring-neck	Bald-pate	Shoveller	Common Merganser
7	30	8	33	11	4	6	1	1	1

Total kill - 102 birds

Hunters reported losing 12 ducks and only 2 of the hunters were accompanied by retrieving dogs.

Table II - Sex by Species

Black		Mallard		G.W. Teal		B.W. Teal		Wood Duck	
Males	Females	Males	Females	Males	Females	Males	Females	Males	Females
4	3	16	14	6	2	19	14	7	4

Pintail		Ringneck		Baldpate		Shoveller		Common Merganser	
Males	Females	Males	Females	Males	Females	Males	Females	Males	Females
4	0	3	3	0	1	0	1	0	1

Total Males - 59
Total Females - 43
Ratio of males to females - 100:73

In future years all birds should be sexed and aged according to adults or juveniles.

Enforcement and Method of Checking

Approximately one-half of the hunters were checked in the marsh and the management information taken. Due to the slow method of travel by foot and canoe, this proved to be a tedious and time-consuming job. The rest of the hunters were checked in the parking areas as they left the marsh. No infractions of the Migratory Birds Convention Act occurred.

Comments

(1) Sanctuaries (See Map #1)

There are two sanctuaries located in Tiny Marsh. Number one is in the south-east corner and number two is in the north-west corner of the marsh. Both of these areas are approximately three hundred acres in size and are corn baited to attract ducks and geese.

To date, these sanctuaries are doing an excellent job of holding waterfowl. However, regular flight patterns between the two areas have not yet been established. I suggest in the future, after these areas have been made proper sanctuaries under law, that only number one in the south-east corner should be baited.

However, hunters were overjoyed at the number of ducks they saw and were able to shoot at. Many commented that this opening day was the best they had enjoyed in years.

(2) Parking Areas (Map #2)

The adjacent fields offer excellent parking areas and are being utilized by hunters. However, there is little parking space on the north side of the marsh, except along the third concession. This creates some confusion and has impeded through moving traffic. I suggest a gravelled parking lot be made on the east side of the ditch. In addition a small parking lot could be established beside the road leading to the dam on the east side of the marsh.

(3) Access (See Map #1)

Tiny Marsh is readily accessible from four different locations. They are as follows:

(a) the first concession, west of the sanctuary

(b) the second concession on the west side

(c) the second concession on the dam or east side

(d) the third concession, east of the sanctuary

In all cases it is only a short distance to the marsh. I do not believe that there should be regular access trails established to make it easy for hunters, and I think that the marsh should be left in as natural a state as possible.

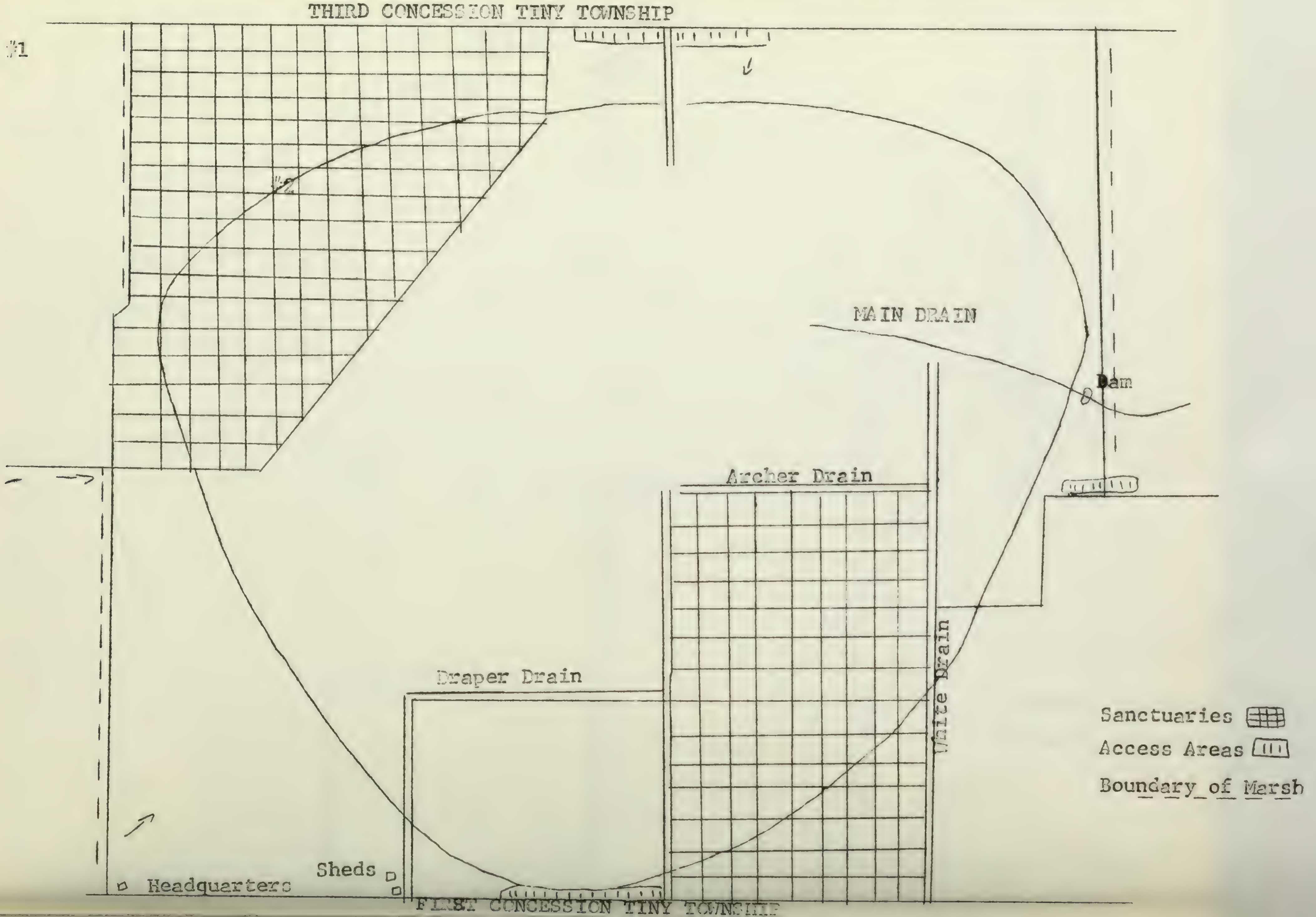
(4) Method of Travel

The Conservation Officers travel about in the marsh on foot or by canoe. This is a slow, time consuming job. Since there is a tremendous amount of work to be done in the marsh, power transportation such as an air boat might solve this problem.

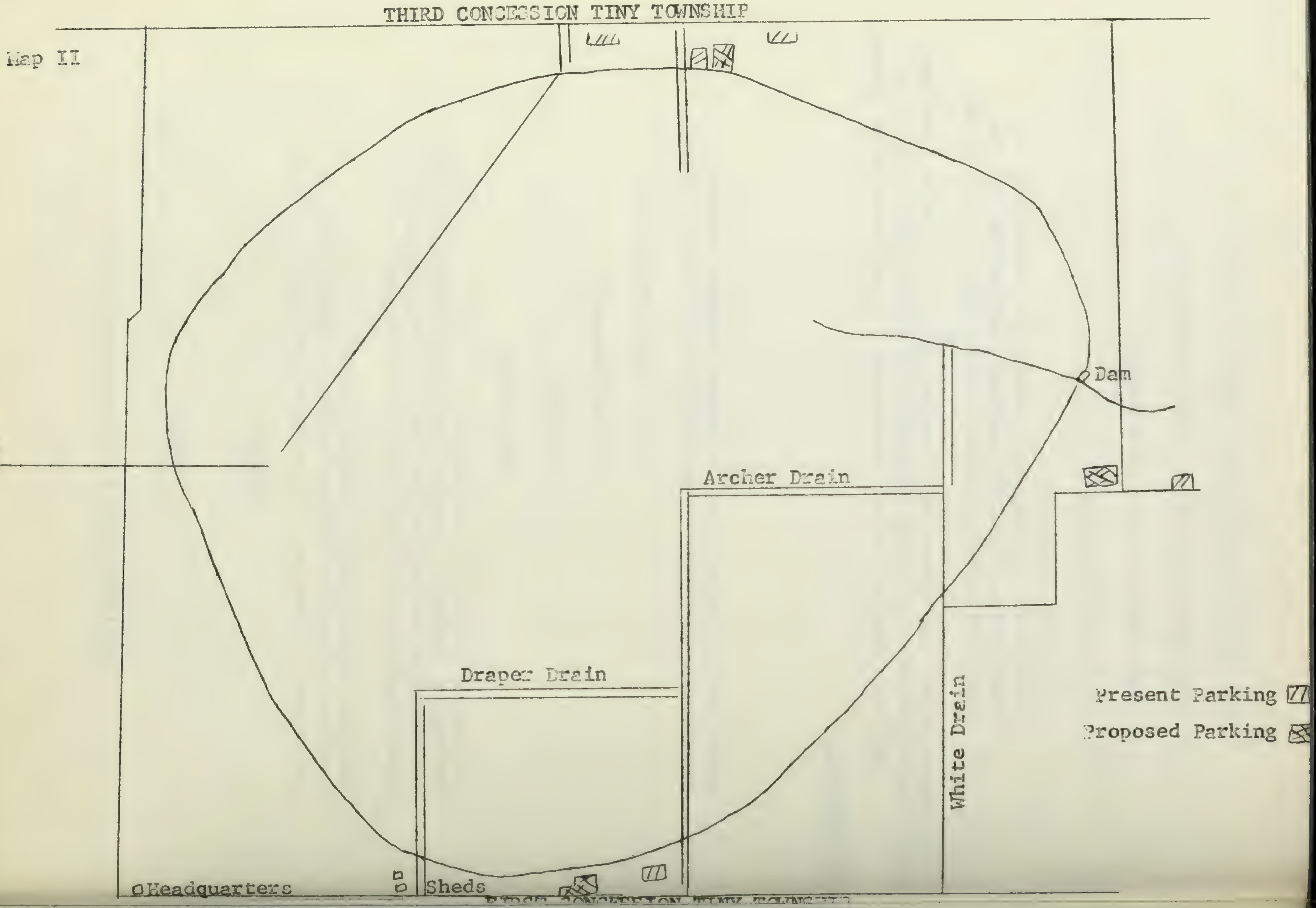
Acknowledgements

The writer wishes to express his thanks to Conservation Officer H. Van Wyck and Fish and Wildlife Supervisor R.H. Trotter, who assisted in the collection of data for this report.

Map #1


THIRD CONCESSION TINY TOWNSHIP
#2
MAIN DRAIN
Dam
Archer Drain
White Drain
Draper Drain
Sheds
Headquarters
FIRST CONCESSION TINY TOWNSHIP
Sanctuaries
Access Areas
Boundary of Marsh

Map II


THIRD CONCESSION TINY TOWNSHIP
Dam
Archer Drain
Draper Drain
White Drain
Present Parking ▨
Proposed Parking ⊠
Headquarters
Sheds
FIRST CONCESSION TINY TOWNSHIP

DUCK MANAGEMENT WITH ARTIFICIAL NESTS

by
R. Manley

Abstract

Enthusiastic interest in the dwindling supply of local pond ducks and poor nesting habitat resulted in the creation of artificial nesting boxes.

These predator-proof nesting boxes were built as a conservation project by the Georgian Bay Hunters and Anglers of Midland, Ontario, and were placed in the following marshes by the writer:

1. Tiny Marsh
2. Wye Marsh
3. Midland Reservoir
4. Sucker Creek Beaver Pond

Twenty-six boxes were constructed with a total of five being used by ducks, for a nineteen percent success.

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Introduction

With an interest in duck management, I had twenty-six plywood duck nesting boxes built by the Georgian Bay Hunters and Anglers, a conservation club. The boxes were erected in the following locations:

1. Ten boxes were installed in Tiny Marsh, which is an area presently being developed and managed by the Department of Lands and Forests for waterfowl and upland game hunting.
2. Ten boxes in Wye Marsh
3. Three boxes in Midland Reservoir
4. Three boxes in Sucker Creek Beaver Pond

The above locations are found on Map #1.

Nesting Boxes - Figures I and 2

The box is formed from a piece of 24" x 44" marine plywood, 1/8" thick, and rolled into a cylinder with a 12" diameter. The plywood is nailed at the bottom seam to hold its shape. A circular piece of 3/4" pine, 12" in diameter is cut in two, forming a 7" and a 5" pair of baffles. The 7" baffle is nailed flush with the front edge of the plywood cylinder and the 5" baffle is set 10" inside the cylinder. These form a pocket where the duck can build its nest.

The boxes were treated with a natural wood preservative, which unfortunately made them very shiny. This preservative was made from boiled linseed oil and turpentine.

Support for the box is provided by a section of 1/2" pipe driven into the mud. The box is slipped over the pipe through a hole in the top of the pole. This allows the box to swing freely with the wind.

Cost of the material and the labour was supplied by members of the Georgian Bay Hunters and Anglers, which amounted to $2.50 per box.

Results

Location	No. of Boxes Erected	No. of Boxes Used	Species	Percentage
Tiny Marsh	10	1	Blue-winged Teal	10
Sucker Creek Beaver Pond	3	0		
Wye Marsh	10	2	Wood ducks	20
Midland Reservoir	3	2	Mallards	66
TOTALS	26	5		19

Descriptions

Tiny Marsh is an area with an abundance of long grasses and hard stem bulrush. In addition there are large wooded areas of flooded poplar and willow.

Sucker Creek Beaver Pond is an area with some natural vegetation in the form of long grasses and cattails.

Wye Marsh is an area with an abundance of cattails and hard stem bulrushes.

Midland Reservoir is an area with little natural vegetation.

Discussion

The success of the nesting boxes this year was very poor in our marshes, possibly for the following reasons:

1. These boxes should have been installed as soon as possible after the heavy surge of spring flood was past, and not left till late in the season. Most of the boxes were erected in the first week of May and some in the second week.

2. The boxes were treated with a wood preservative which made them very shiny. They should have been allowed to weather prior to erection.

3. There was a tremendous fluctuation in the water level because of heavy rainfall this spring and a great many of the boxes were flooded out.

4. Tiny Marsh and Wye Marsh have an abundance of natural shorecover, ideal habitat suitable for natural nesting sites. In both places, many natural nests were observed, some even close to the nesting boxes.

Recommendations

It is felt, however, because of the high success obtained in other areas, this can be a worthwhile continuing program, contributing greatly to duck management.

In wet land areas, these nesting devices or boxes may offer sites to wild ducks where their production has ceased for want of suitable shore-cover. This project will be renewed each year in ponds where there is insufficient natural shore-cover for ducks to nest.

Acknowledgements

I wish to thank members of the Georgian Bay Hunters and Anglers who contributed their time and efforts in constructing the duck nesting boxes.

References

Madson, J.B. Plywood Potholes
Cary, B. Duck Factory - Reprinted from Outdoor Life, Vol. 127, May, 1961.

Map #1

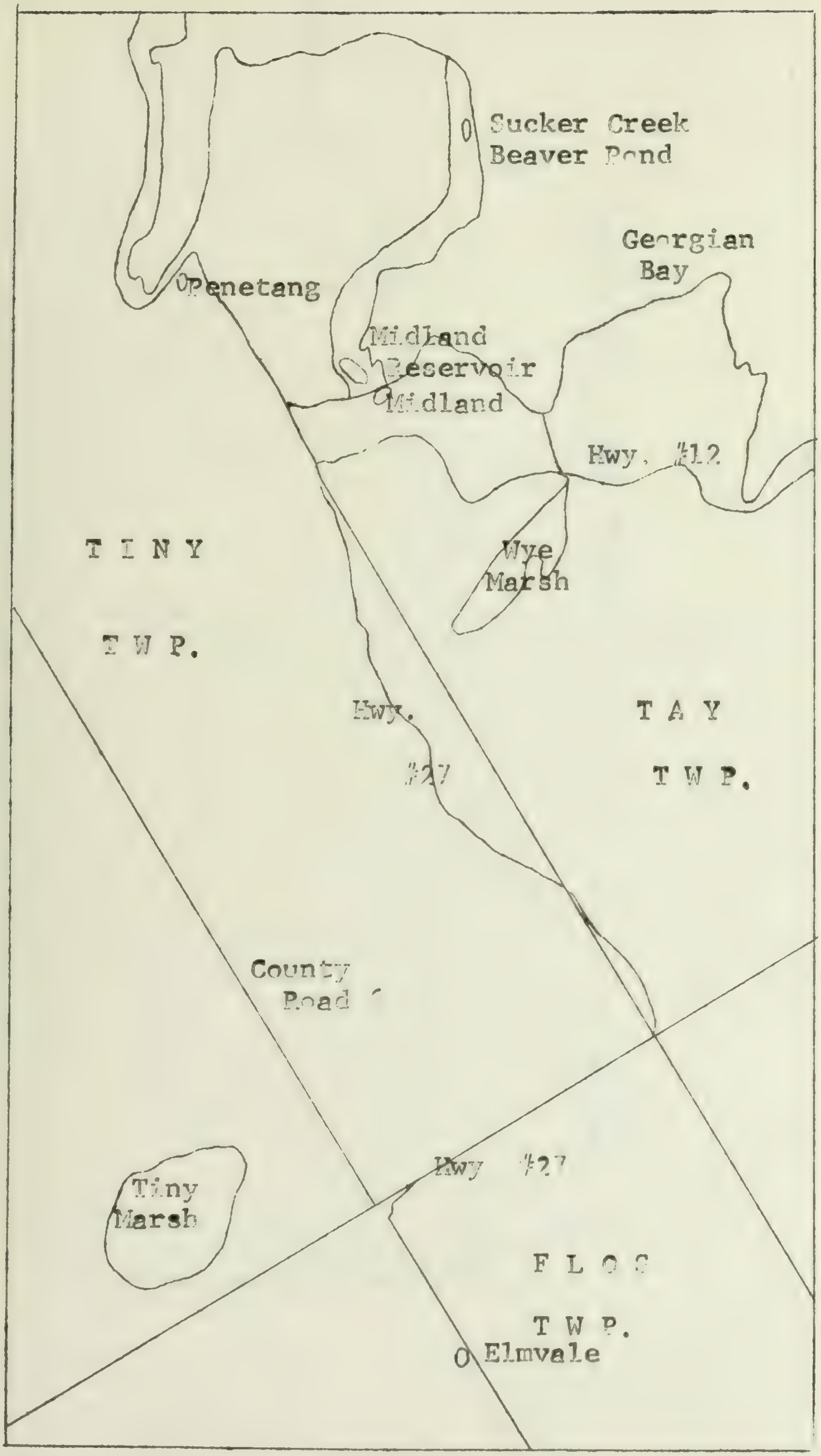

Sucker Creek
Beaver Pond
Georgian
Bay
Penetang
Midland
Reservoir
Midland
Hwy. #12
TINY
TWP.
Wye
Marsh
Hwy.
#27
TAY
TWP.
County
Road 6
Hwy #27
Tiny
Marsh
FLOS
TWP.
Elmvale

Figure #1

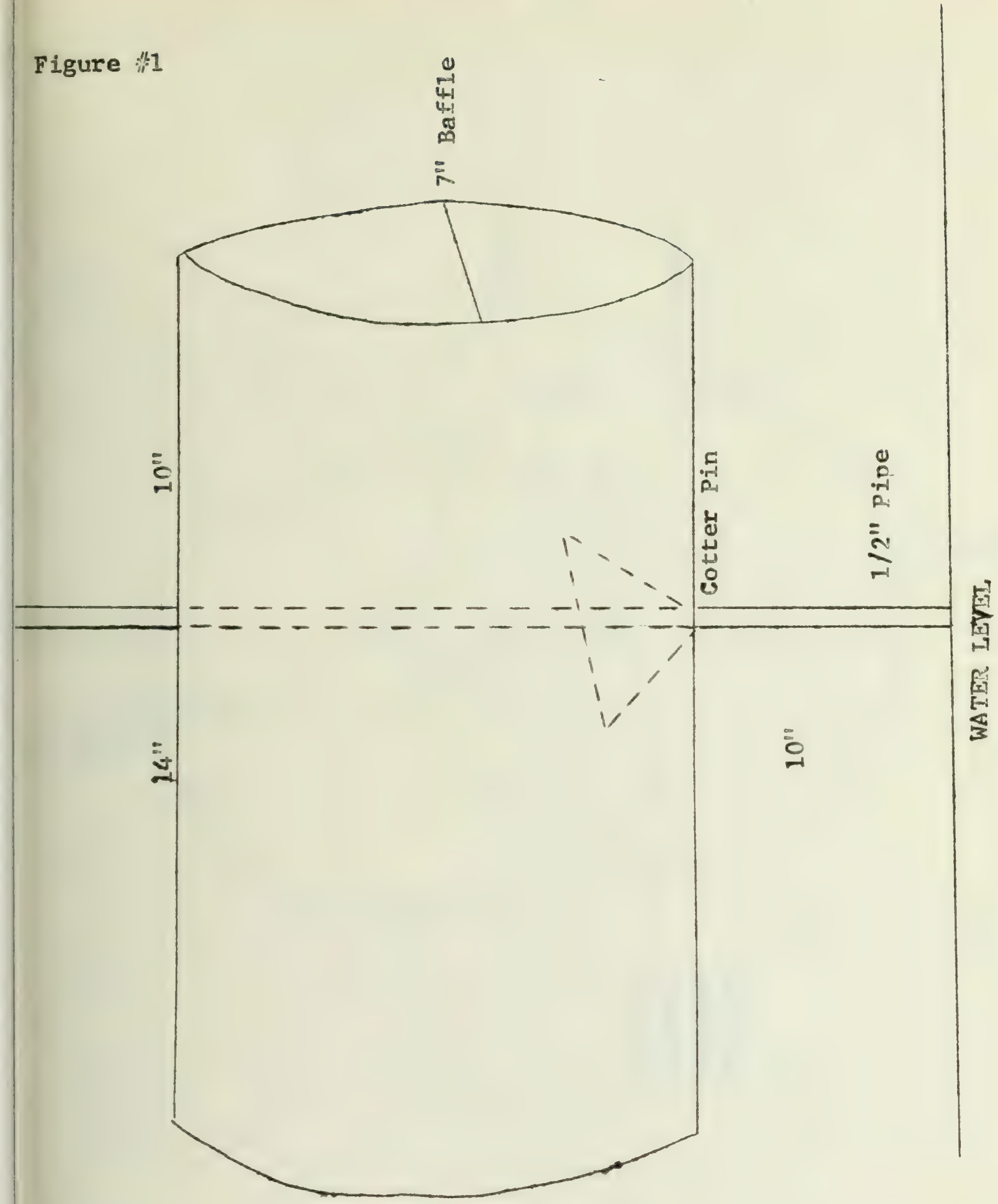
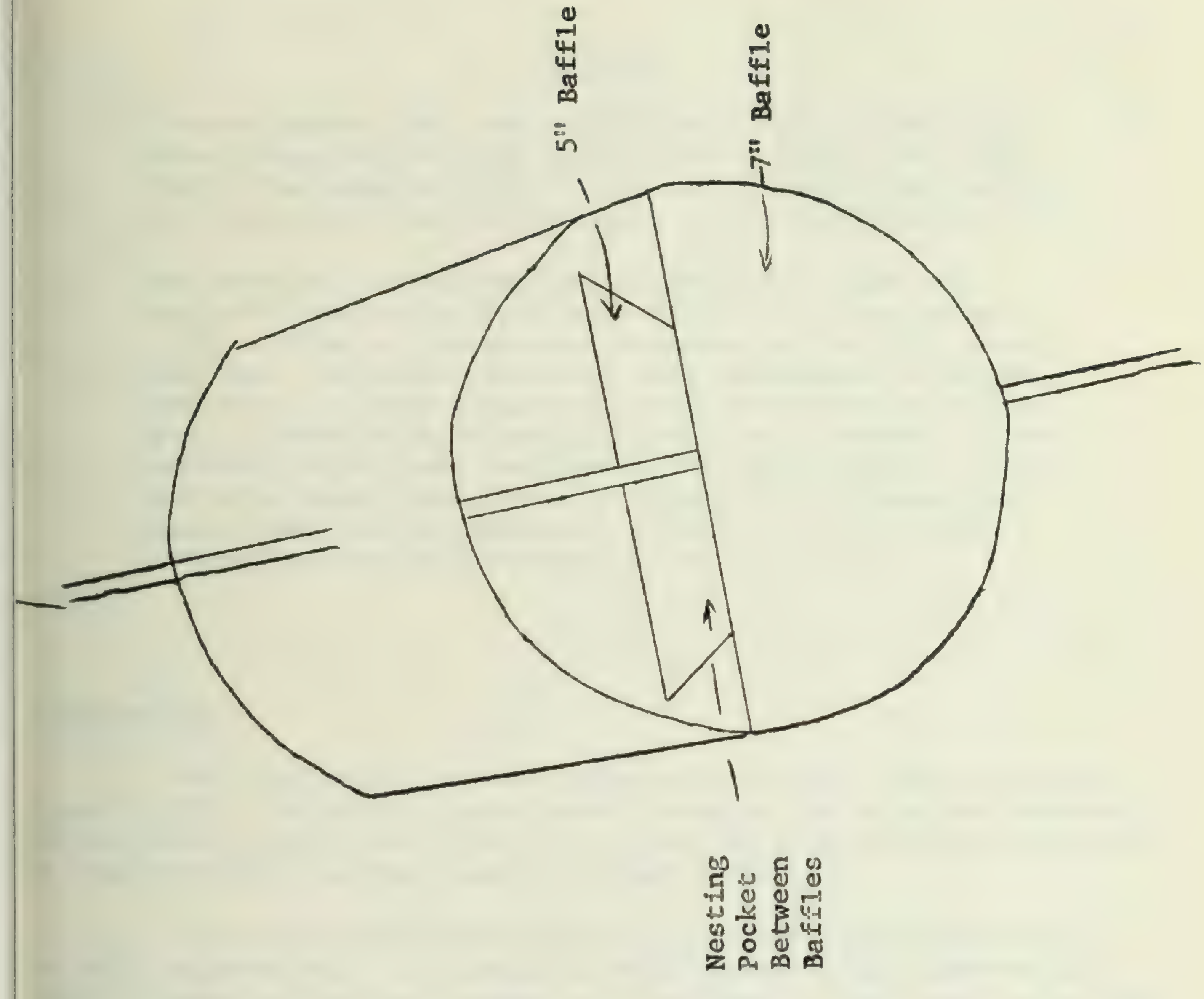


Figure II



LITTLE RALEIGH LAKE MOOSE BROWSE SURVEY

1967

by

Hans van Rosen and K.E. Bibby.

Abstract

A Moose Browse Study was undertaken on the Raleigh Lake Moose Concentration Area on May 24th., 25th., and 29th., 1967. The purpose of the study was to determine reasons for the gradual decline of moose in the study area.

One thousand six hundred and sixteen live stems of available browse per acre were found. This represents a 52% decline in browse when compared to the 1963 survey findings. Extensive windfall with subsequent salvaging operations in 1964 eliminated cover in the heart of the area. Little sign of moose activity was observed in the southern and western portions of the study grounds. A crotising count resulted in a figure of 1.75 moose per square mile. This represents a decline of 65% when compared to results obtained in 1963.

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Introduction

As a follow-up to the aerial moose census carried out in January 1967, the Raleigh Lake Moose Concentration Area was surveyed on May 24th., 25th., and 29th. This area had been surveyed previously by Simkin (1959), and Monk and Armstrong (1963).

To obtain comparable results previous cruise-lines were strictly adhered to. The fact that moose density, as observed by aerial survey and ground observation, declined in the area during the past three winters was an additional reason to carry out a browse inventory.

Location

The area is situated on the south side of Highway 17, approximately 13 miles west of Ignace. Highway 17 constitutes the north boundary, a large swamp the east boundary, a muskeg and Little Raleigh the west boundary. The southern portion of the survey area appears to be well out of the moose wintering grounds.

Size and Description

Size of the total area was taken as 1750 acres from previous records, 834 acres of which were in the immediate survey area. A detailed description of topography and geology has been given by Carl E. Monk in the 1963 report.

The entire area appears to have been burnt over in the severe fires of 1922. A hurricane in July 1964 resulted in extensive windfalls and subsequent salvage logging operations on 120 acres in the heart of the heavily utilized area. This cut-over presently supplies the bulk of the available browse, but offers very little cover. Timber types are mixed. Jackpine and Trembling Aspen are dominant in the southern section. White Birch and Trembling Aspen constitute the overstory on the remainder. Crown density varies from 50% to 80% in the south to from 0% to 40% in the north. The understory consists largely of Alder, Mountain Maple, Balsam Fir and Hazel.

Procedure

The procedure adhered to was outlined in the notes of the Fish and Wildlife Certificate Course, 1964, as per head office memorandum re 1963 moose browse surveys. Browse plots of 1 chain length and 1/10 chain width were sampled at 4 chain intervals. Each plot was 1/100th. acre in size. Cruise intensity was 0.25%. Pellet groups were counted on 1/50th. acre plots, 13.2 feet wide, one chain long at 4 chain intervals. In addition a continuous crotising strip cruise was carried out on the remainder of the cruise lines giving a 2% sample of the cruised area. Cruise lines were laid out at ten chain intervals in a north-south direction. Care was taken to run cruise lines as closely as possible to lines shown on the maps of previous surveys.

Population Estimate

The date of major leaf fall was established as Oct. 11, 1966. Two hundred and five days were considered for pellet deposition. A total of 16 winter pellet groups were counted on 111 plots, i.e. 7.2 pellet groups per acre.

Area of surveyed territory: 834 acres.

Number of 1/50th. acre plots for pellet group count: 111

Cruise intensity: $\frac{\text{Total area in acres (834)}}{\text{Acres in sample (2.22)}}$ i.e. 1/4%

$\frac{16 \text{ pellet groups}}{2.22 \text{ acres}} = \frac{x \text{ pellet groups}}{834 \text{ acres}} = 6000$ calculated groups

$\frac{2.3 \text{ moose}}{834 \text{ acres}} = 1.76$ moose per square mile

1967 Raleigh Lake Moose Browse Inventory

Species	Frequency Index	Living Stems Per Acre	% Stems Browsed	% Stems Killed	% Stems Hedged	% of Available Browse
Birch	.46	278	20	8	7	14
Balsam	.44	158	43	10	31	10
M. Ash	.19	94	14	13	65	5
Willow	.40	322	19	5	7	21
Maple	.31	509	23	3	7	34
Dogwood	.01	11	0	0	0	.5
June Berry	.21	72	20	0	11	3
Cherry	.13	38	41	26	12	3
Poplar	.22	88	9	3	4	5
Hazel	.25	96	35	6	29	6
Totals		1616	22.4	7.4	17.3	

Conclusions

In addition to species laid out in the standard tally form a considerable number of browsed tag-alders were discovered. The windfall and cut-over area, which is producing most of the available browse showed very little utilization, possibly due to lack of cover. Mountain Ash, Maples, Balsam Fir and Willows showed considerable hedging in the remainder of the area.

A comparison of the compiled survey data with results of the 1963 survey reveals the following:

(a) The total amount of available browse has declined by approximately 50% over the past 4 years.

(b) The number of moose wintering in the area has declined considerably faster, namely by 65% over the same period. Therefore, the rapid decline of moose could be due in part to an increase in hunting pressure as well as a decrease in browse.

(c) In view of the scarcity of fodder and the absence of any number of moose it is suggested that the Raleigh Lake Study area be relocated to either Camp Lake or to Osaquan - Valjean Lakes where concentrations of moose are known to occur.

References

Monk, C.E. (1963) Moose Browse Survey, Sioux Lookout District, Unpublished District Report.

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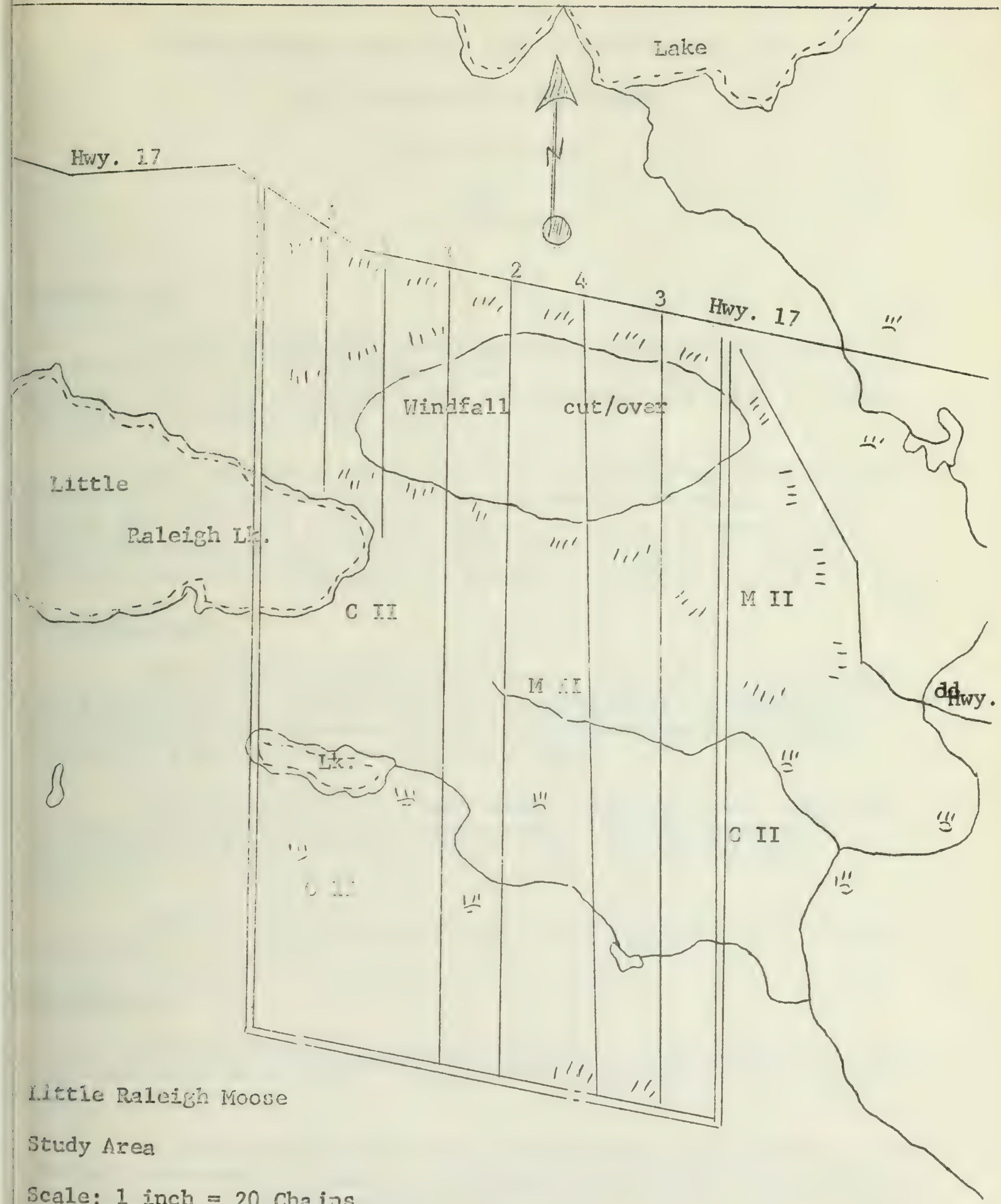

Little Raleigh Moose

Study Area

Scale: 1 inch = 20 Chains

Base Map 494 914

MOOSE BROWSE SURVEY AND PELLET GROUP COUNT, 1966

PLUS EVALUATING PAST SURVEYS

GOGAMA DISTRICT

by
R.W. Close

Introduction

In the winter of 1966-67 an aerial Moose Inventory survey was conducted over the Nabakwasi plot. A browse and pellet survey was done on Nabakwasi sub-plot III and Nabakwasi sub-plot XI during the latter two weeks of May 1967.

The purpose of this report is to compare the winter aerial survey with the results found using the browse and pellet survey done in May 1967. As a further purpose, we wish to compare our browse and pellet survey results with those obtained on Nabakwasi sub-plot III in 1960 and those on Nabakwasi sub-plot XI in 1962.

Plot Description

The Nabakwasi Aerial Moose Census Plot has an area of 33 square miles and is located partially in Brunswick, Londonderry, Miramichi, Togo and Connaught Townships (an accompanying diagram locates the plot and the two sub-plots used).

The plot varies from open mixed forest to dense jack pine and from bare bedrock to deep loam marshes. The topography is regular rolling hills with occasional steep outcrop and high hill area.

Aerial Moose Inventories have been conducted on this plot since 1957.

Nabakwasi III

Nabakwasi sub-plot III was used for timber operations until it was burned over in 1941. The sub-plot has an area of 1.4 square miles.

A high percent of the over-story remains open but the existing over-story is mixed and averages from 30' to 40' in height. The under-story is mainly mountain ash, cherries, white birch, hazel, willow and maple but again this is not dense.

The soil is generally sandy loam and varies from 0' to 8' in depth.

Nabakwasi XI

This sub-plot was also a part of the 1941 fire but since the fire the natural regeneration has been dense jack pine on the northern 4/5ths and poplar and dense jack pine on the southern 1/5th.

The topography in this sub-plot is gently rolling. The soil is sand to sandy loam and is on the average two feet in depth. Large timber which windfell after the 1941 fire is still very prevalent on the forest floor of this 1.5 square mile sub-plot.

Methods

The sub-plots were sampled by following the same series of parallel and perpendicular transects of the Conservation Officer in 1960 and of George E. Vozeh in 1962.

Similarly the survey comprised of

(a) Pellet group count taken on 1/10 acre and 1/50 acre,

(b) Moose browse survey.

For the browse survey the total living before the winter was considered to be the total of the living, plus the hedged, plus the browsed. The total living after the winter was considered to be the unbrowsed, plus the unhedged and plus the live stems.

The addition of the "percent of total browse supplied by each species" column in Table number I and Table number 2 was added to show which species were preferred by the moose.

The browse survey results were published in an attempt to explain the apparently slow regeneration on sub-plot III and since the Table seemed to make sense we applied it to sub-plot XI to see if it could explain why normal regeneration was occurring.

Population Estimate from Pellet Groups

Results - Nabakwasi III

Of the 80 plots (1/10 acre) surveyed 20 plots had no pellet groupings on them; that is, on 75% of the plots one or more pellet groupings were found. Using 95% confidence limits, a deposition rate of 13 pellet groupings a day and a deposition time of 210 days

the average population on sub-plot III is 5.4 moose per square mile.

When we used the 30 plots (1/50 acre) and the same deposition rate, the same deposition time and the same confidence limits, the average population is 9.4 moose per square mile.

Results - Nabakwasi XI

On this sub-plot 84 plots (1/10 acre) were surveyed and of these 65 had no pellet groupings on them; that is 72% of the plots had no pellet groupings on them. With 95% confidence limits a deposition rate of 13 pellets per day and a deposition time of 210 days, the average population is 1.3 moose per square mile.

We considered the 1/50 acre plots and using the same constants we found 1.6 moose per square mile.

Extent of Browsing

Nabakwasi III

Mountain Ash appeared on 75% of the sub-plots while cherries and white birch appeared on more than 50% of the sub-plot.

Referring to the "percent of browse supplied by each species" column on Table #1, Mountain Ash, Willow and Hazel supplied 75% of all the browse.

Maple, Hazel and Mountain Ash stems were present in equal numbers but Mountain Ash supplied twice the amount of browse than either Maple or Hazel did.

Although Willow was one-half as abundant as Cherry and 1/3 as abundant as Hazel it supplied the same amount of browse as either Cherry or Hazel.

Poplar, Juneberry and Dogwood have been of no use to the moose as food-stuff.

Nabakwasi XI

Of the palatable growth present White Birch, Cherries and Hazel were the most abundant on this sub-plot.

The five species, Hazel, Willow, Mountain Ash, White Birch and Maple supplied 87.5% of all browse.

Although Hazel was much more abundant than either Mountain

Ash or Willow, of the two combined, Mountain Ash and Willow supplied 38.6% of the browse taken while Hazel supplied only 25% of the browse taken.

Dogwood, Balsam, Poplar and Cherries supplied very little of the browse taken on this sub-plot.

While the percent of stems browsed for each species is low in all but one case, the Jack Pine surrounding the mixed tree area was too thick to permit entry of moose and therefore the available browse in this area was not obtainable. The one exception was due to a very small number of living stems found and hence each stem browsed means a large percent of the available browse taken.

Discussion

Nabakwasi III

The 1967 winter aerial survey showed that 73 moose were present on the Nabakwasi plot. Of this number, 2 moose were on Nabakwasi sub-plot III. Our results shows a minimum of 5.4 per square mile and a maximum of 9.4 per square mile moose on sub-plot III.

It was discovered after the survey was completed that when each line was started the crews immediately ran a one chain plot instead of running four chains and then a one chain plot. The effect of not running four chains at the beginning of each line was to reduce the pellet count and therefore reduce the moose per square mile when computed on the 1/10 of an acre plots. (The total lost was 40 chains of count). We therefore are assuming that the 9.4 moose per square mile is the correct figure. However, as mentioned, the aerial survey showed only two moose on the plot or approximately 1.4 moose per square mile (a map of the entire Nabakwasi plot is supplied and the results of the aerial survey are located on this map). It is obvious that although the moose were not on sub-plot III on December 21st, the day of the aerial survey, they were very abundant on the two plots adjoining. It is therefore, not hard to see that as the winter progressed, the moose could easily have moved into sub-plot III.

More aerial surveys later on in the winter could have verified this but due to bad flying conditions, more flights were impossible.

Nabakwasi XI

The aerial survey showed that Nabakwasi sub-plot XI had one moose or .5 moose per square mile while our pellet survey shows

1.3 moose per square mile. Again upon inspection of the aerial survey map there is a heavy concentration of moose to the south-west of the sub-plot XI and as the winter progressed some of the moose could have moved from sub-plot XII to sub-plot XI.

The browse surveys in both the sub-plots added little information to the moose population but it did support earlier evidence that moose prefer Mountain Ash, Willow and Hazel before the other species that were included in the survey.

Although little browsing was observed in conifers the moose pellets were observed in off-the-plot conifer stands. This, to a great extent, was observed on sub-plot III and not on sub-plot XI.

Comparison

Sub-plot III

In 1960 this sub-plot showed a moose population of 4.1 moose per square mile. In the 1967 survey we found 9.4 moose per square mile. Reasons for an increase of moose may be that the entire forest is growing in height all except in this area, which is open mixed forest where only established trees are growing in height. Since the area has a history of a high moose density we might expect that the yearly growth is browsed, hedged or killed on many of the plants each year. That is, the yearly growth is maintained at a minimum level by the action of the moose, other animals, and the elements. This action allows the moose access to the area and as other areas become over-grown they force a greater population density in the remaining accessible areas.

Comparing column 5 with column I of Chart One and also comparing the total of column I and the total of 5, we see that the growth is kept down by damage to about half of the plants.

Chart I

	I Live	2 Killed	3 Browse	4 Hedged	5 KBH Totals
White Birch	80	17	19	24	60
Mt. Ash	170	46	139	96	281
Willow	49	16	56	80	152
Maple	169	4	28	14	46
Dogwood	0	0	0	0	0
Cherry	143	36	27	24	87
Poplar	17	6	5	4	15
Hazel	150	0	48	14	62
Balsam	5	2	0	20	22
Juneberry	1	0	0	0	0
	685*	127	325	276	725*

Sub-plot XI

We would expect then that since moose are not abundant in this sub-plot that the damage to plants would be less and therefore the forest would be able to grow up and make the area even more inaccessible to the moose. We know that the Nabakwasi sub-plot XI is mainly Jack Pine, a specie which is unpalatable to the moose, and we don't expect damage from moose to be high in this area because of this fact. Therefore, we expect the forest of Jack Pine to grow up and force the moose out. Since the other species are not being browsed by as many moose we would expect them to grow out of reach of the moose.

As seen on Chart Two, the damaged plants are about one-quarter of the untouched plants. This means that each year three-quarters of the plants are allowed to grow without damage. Therefore the palatable forest is growing out of reach of the moose and the area cannot supply a greater number of moose with browse.

Chart II

	Living	Browsed	Hedged	Killed	KBH Totals
White Birch	117	11	4	33	48
Mt. Ash	45	15	4	5	24
Willow	31	19	4	6	29
Maple	103	10	1	6	17
Dogwood	12	0	0	2	2
Cherries	126	4	0	34	38
Poplar	8	1	1	4	6
Hazel	214	22	0	34	56
Balsam	16	0	2	3	5
Juneberry	1	6	0	1	7
	666*	88	16	128	232*

Conclusions

I. The 1966-67 winter aerial survey was not complete enough to show results that coincide with the spring browse and pellet survey on sub-plot III. On sub-plot XI the winter aerial survey was close but, again, incomplete due to the limited aerial surveys.

2. Results of the Nabakwasi sub-plot XI 1967 surveys compare closely to those of 1962.

While the results of the Nabakwasi sub-plot III 1967 surveys were considerably higher than those of 1960 we do not feel that they are out of line.

Acknowledgements

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References

A Moose Population Census and Winter Browse Survey in Gogama District by G.E. Vozeh and H.G. Cumming, Gogama District Moose Browse Survey Reports.

TABLE #1

BROWSE SURVEY RESULTS - SUB-PLOT III

	# of Plots on which Species Occurred	Fre-quency Index	Living Stems On Plots	Living Stems per Acre	% Stems Browsed	% Stems Hedged	% Stems Killed	% of Browse Supplied by Species	Available % of Browse Supplied by Each Species
White Birch	45	.56	80	330	15.44	11.51	12.14	8.00	5.84
Mountain Ash	58	.73	170	701	34.32	23.70	10.19	29.30	42.77
Willow	35	.43	49	202	30.27	43.24	7.96	13.30	17.23
Maple	25	.31	169	697	13.27	6.63	1.86	15.26	8.61
Dogwood	0	0	0	0	0	0	0	0	0
Cherry	53	.66	143	590	13.91	12.37	15.65	14.03	8.3
Poplar	14	.17	17	70	19.23	15.38	18.75	1.00	1.54
Hazel	25	.31	150	619	22.64	6.60	0	15.34	14.76
Balsam	11	.13	5	21	0	20.00	7.40	1.33	0
Juneberry	1	.01	1	4	0	0	0	0	0

Total Living all Species = 1,382

Plots Surveyed - 80

TABLE #2

BROWSE SURVEY RESULTS - SUB-PLOT XI

	# of Plots on which Species Occurred	Frequency Index	Living Stems on Plots	Living Stems Per Acre	% Stems Browsed	% Stems Hedged	% Stems Killed	% of Browse Supplied by Species	Available % of Browse Supplied by each Species
White Birch	46	.55	117	459.6	.33	.03	20	12.5	17.0
Mountain Ash	21	.25	45	176.8	.23	.06	7.2	17.0	6.0
Willow	21	.25	31	121.8	.35	.07	10	1.6	4.7
Maple	24	.29	103	404.6	.09	.01	5	11.4	15
Dogwood	2	.02	12	47.1	0	0	16.6	0	1.0
Cherries	46	.55	126	49.5	.08	0	20.7	4.5	10.9
Poplar	6	.07	8	31.4	.1	.1	20.6	1.1	1.2
Hazel	40	.48	214	840.7	.09	0	12.6	25.00	32.1
Balsam	7	.08	16	62.9	.0	.11	14.3	0	2.4
Juneberry	7	.08	1	3.9	.05	0	12.5	6.0	.15

Plots Surveyed = 84

Appendix I

Population Density Estimates of I Chain Plots

Nabakwasi River - Sub-Plot III

Pellet Groups	N	X	X^2
0	45	-	-
1	20	20	20
2	7	14	28
3	3	9	27
4	4	16	64
5	1	5	25
	80	64	164

Calculations

$$\text{Mean} = \frac{x}{n} = \frac{64}{80} = .8$$

$$S^2 = \frac{Ex^2 - \frac{(Ex)^2}{N}}{N-I} = \frac{164 - \frac{(64)^2}{80}}{80 - I}$$

$$= \frac{164 - \frac{64 \times 64}{80}}{79}$$

$$= \frac{564}{395} = 1.42$$

$$S = 1.42$$

$$= 1.19$$

$$Sm = \frac{S}{N}$$

$$= \frac{1.19}{80}$$

$$= \frac{1.19}{8.95}$$

$$= .133$$

Appendix I (Cont'd)

95% Confidence limits

= .133 x 1.96

- .261

Since confidence limits ± .8 ± .261

Upper limit = 1.061

Lower limit = .539

I. Pellet Groups Per Acre = .8 x 50 = 40.0

Limit = 50 x ± .261 = ± 13.050

Upper limit = 53.00

Lower limit = 27.00

2. Moose Days per Square Mile $= \frac{40 \times 640}{13} = \frac{25600}{13}$

= 1969

Upper limit $= \frac{640 \times 53}{13}$

= 2609

Lower limit $= \frac{640 \times 27.00}{13}$ = 1329

3. Moose Per Square Mile $= \frac{1969}{210} = 9.37$

Upper limit $= \frac{2609}{210} = 12.4$

Lower limit $= \frac{1329}{210} = 6.33$

Appendix II

Population Density Estimates of 5 Chain Plots

Nabakwasi Sub-Plot III

Pellet groups per acre $= \frac{186 \times 5}{80} = \frac{930}{8}$

$= 116.25$

5 Chain Plots (1/10 acre)

Pellet Groups	N	X	X^2
0	20	-	-
1	13	13	13
2	13	26	52
3	12	36	108
4	11	44	176
5	3	15	75
6	6	36	216
7	0	0	0
8	2	16	128
	80	186	768

5 Chain Plots (1/10 acre)

Calculation

Mean $= \frac{186}{80} = 2.3$

$$S^2 = \frac{Ex^2 - (Ex)^2}{N - I}$$

$$= \frac{768 - \frac{(186)^2}{80}}{79}$$

Calculation (Cont'd)

$$= \frac{768 - \frac{34596}{80}}{79} = \frac{335.5}{79} = 4.24$$

S $= 21$

Sm $= \frac{2.1}{80} = \frac{2.1}{8.99} = .233$

95% Confidence limits $= .233 \times 1.96$

$= .457$

Since confidence limits $= 2.3 \pm .457$

Upper limit $= 2.757$

Lower limit $= 1.843$

Pellet Groups per Acre $= 2.3 \times 10 = 23.0$

Upper limit $= 2.757 \times 10 = 27.57$

Lower limit $= 1.84 \times 10 = 18.4$

Moose Days per Square Mile $= \frac{23.0 \times 640}{13}$

$= 1132.3$

upper limit $= \frac{27.6 \times 640}{13} = 1351.08$

Lower limit $= \frac{18.4 \times 640}{13} = 905.0$

Moose Per Square Mile $= \frac{1132.3}{210} = 5.4$

Upper limit $= \frac{13510.8}{210} = 6.4$

Lower limit $= \frac{905}{210} = 4.3$

Appendix III

Nabakwasi Sub-Plot XI (for I chain plots)

Pellet Groups	N	X	X^2
0	77	-	-
1	4	4	4
2	1	2	4
3	2	6	18
	84	12	26

Calculations

Mean $= \frac{X}{N} = \frac{12}{84} = .14$

$$S^2 = \frac{Ex^2 - \frac{(Ex)^2}{N}}{N - I}$$

$$= \frac{26 - \frac{144}{84}}{83} = \frac{24.3}{83}$$

S $= .54$

Sm $= \frac{.54}{484} = \frac{.54}{91} = .06$

95% confidence limits = .06 x 1.96 - .117

Since confidence limit = .14 ± .117

Upper limit = .257

Lower limit = .023

Pellets Groups Per Acre = .14 x 50

= 7.00

Limits 50 x .117 = ± 5.85

Upper limits = 12.85

Lower limits = 1.15

Appendix III (Cont'd)

Moose Days Per Square Mile $= \frac{7 \times 640}{13} = 344.4$

Upper limit $\frac{12.85 \times 640}{13} = 640$

Lower limit $\frac{1.15 \times 640}{13} = 56.6$

Moose Per Square Mile $= \frac{344}{210} = 1.6$

Upper limit $= \frac{640}{210} = 3$

Lower limit $= \frac{56.6}{210} = .27$

Appendix IV

Nabakwasi Sub-Plot XI (for 5 chains per plot)

Pellet Groups	N	X	X^2
0	65	-	-
1	7	7	7
2	5	10	20
3	2	6	18
4	1	4	16
5	2	10	50
6	2	12	72
	84	49	183

Pellets Groups per Acre $\frac{49 \times 50}{84} = 29.1$

Mean $\frac{49}{84} = .58$

Appendix IV (Cont'd)

$S^2 = \frac{Ex^2 - (Ex)^2}{N - I}$

$= \frac{183 - \frac{(49)^2}{84}}{83}$

$= \frac{183 - 28.6}{83}$

$= \frac{154.4}{83}$

$= 18.6$

$S = 4.31$

$Sm = \frac{4.31}{.184} = \frac{4.31}{9.1} = .47$

95% confidence limit = .47 x 1.96

= .9212

Since confidence limit = .58 ± .92

Upper limit = 1.50

Lower limit = 0

Pellet Groups Per Acre = .58 x 10 = 5.8

Upper limit = 15.0

Lower limit = 0

Moose Days per Square Mile $= \frac{5.8 \times 640}{13}$

$= \frac{3712}{13} = 285$

Upper limit $= \frac{15 \times 640}{13} = 738$

Lower limit = 0

Moose Per Square Mile $= \frac{285}{210} = 1.3$

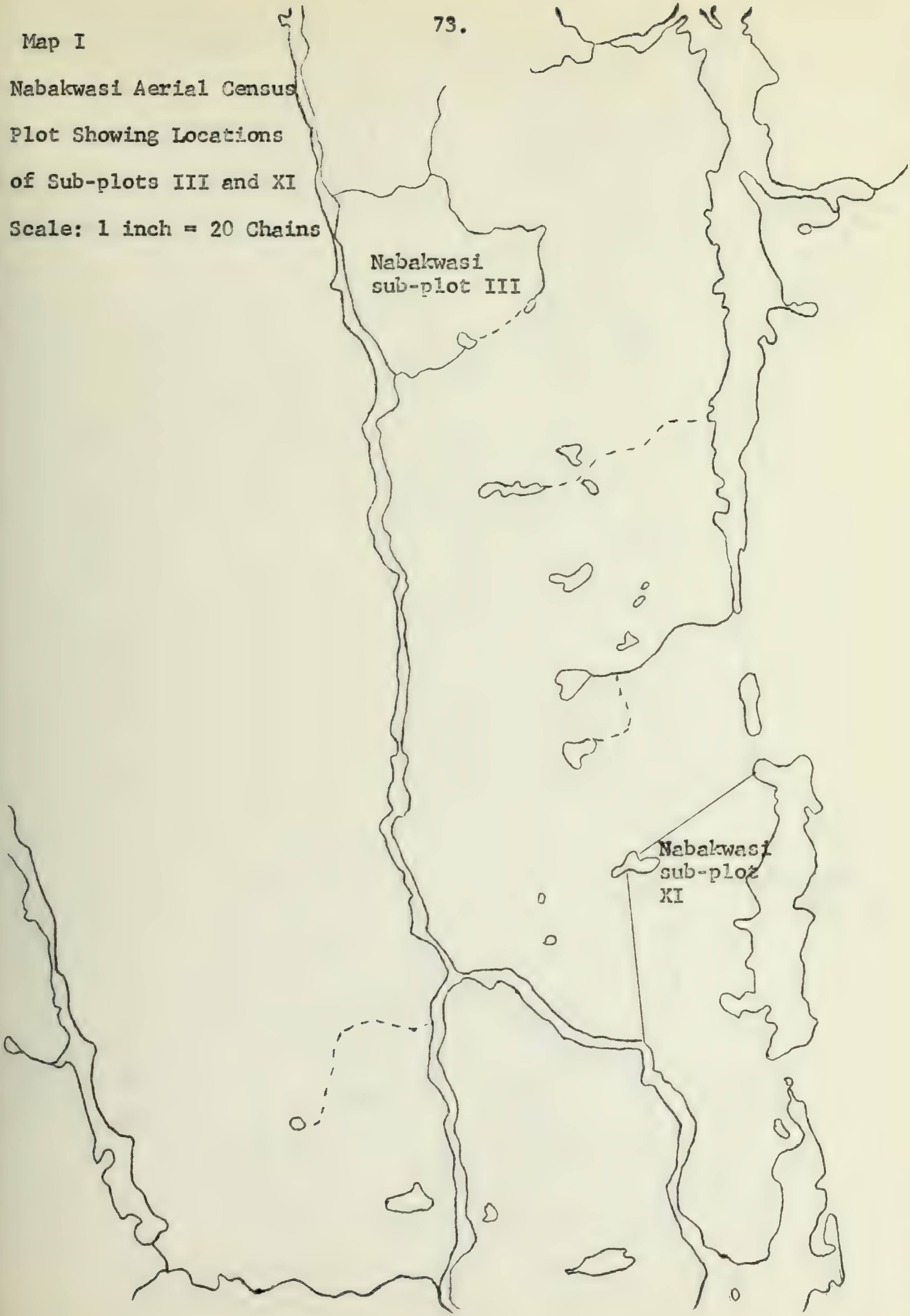
Upper limit $= \frac{738}{210} = 3.5$

Lower limit = 0

Map I

Nabakwasi Aerial Census Plot Showing Locations of Sub-plots III and XI

Scale: 1 inch = 20 Chains



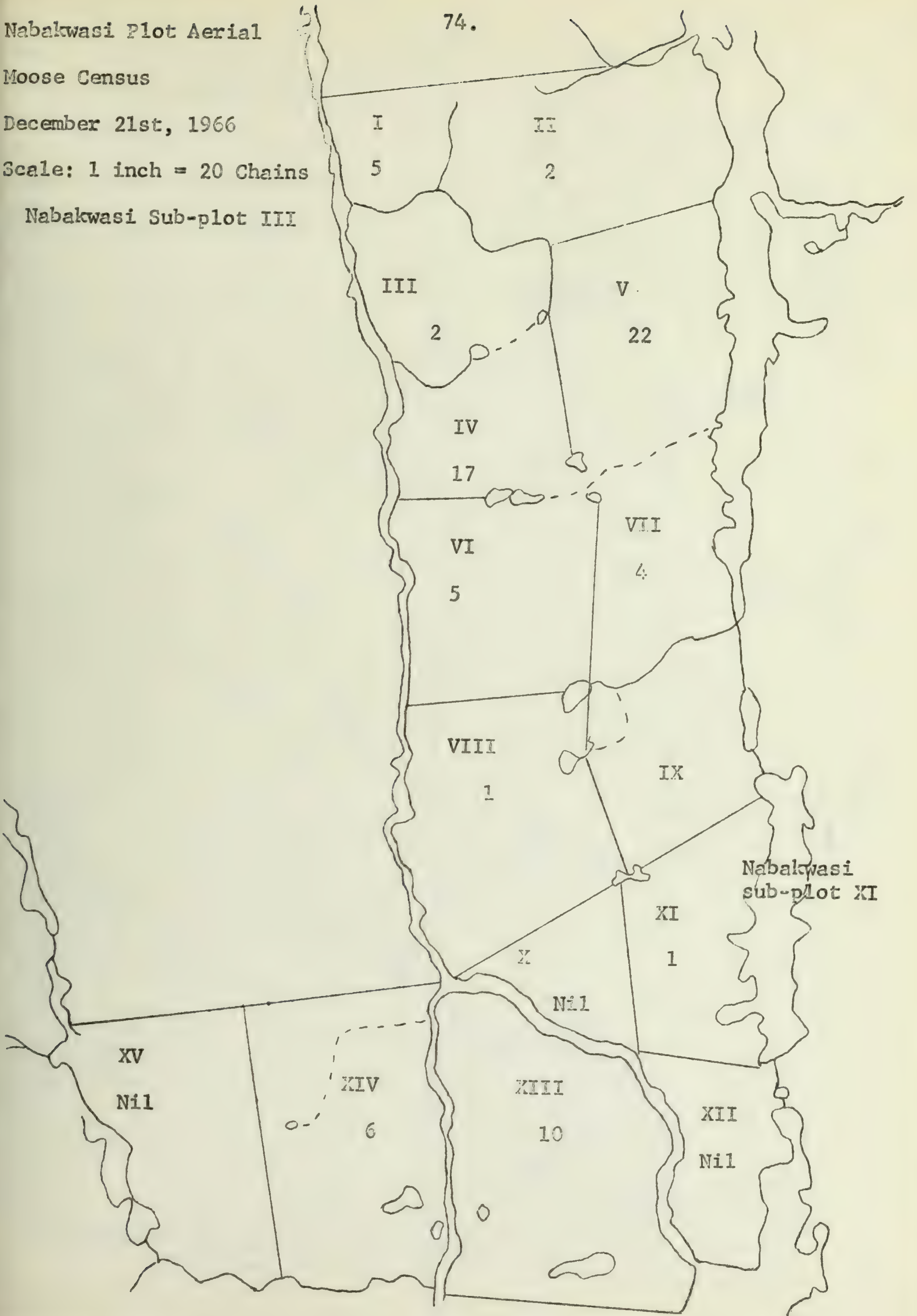
Nabakwasi Plot Aerial

Moose Census

December 21st, 1966

Scale: 1 inch = 20 Chains

Nabakwasi Sub-plot III



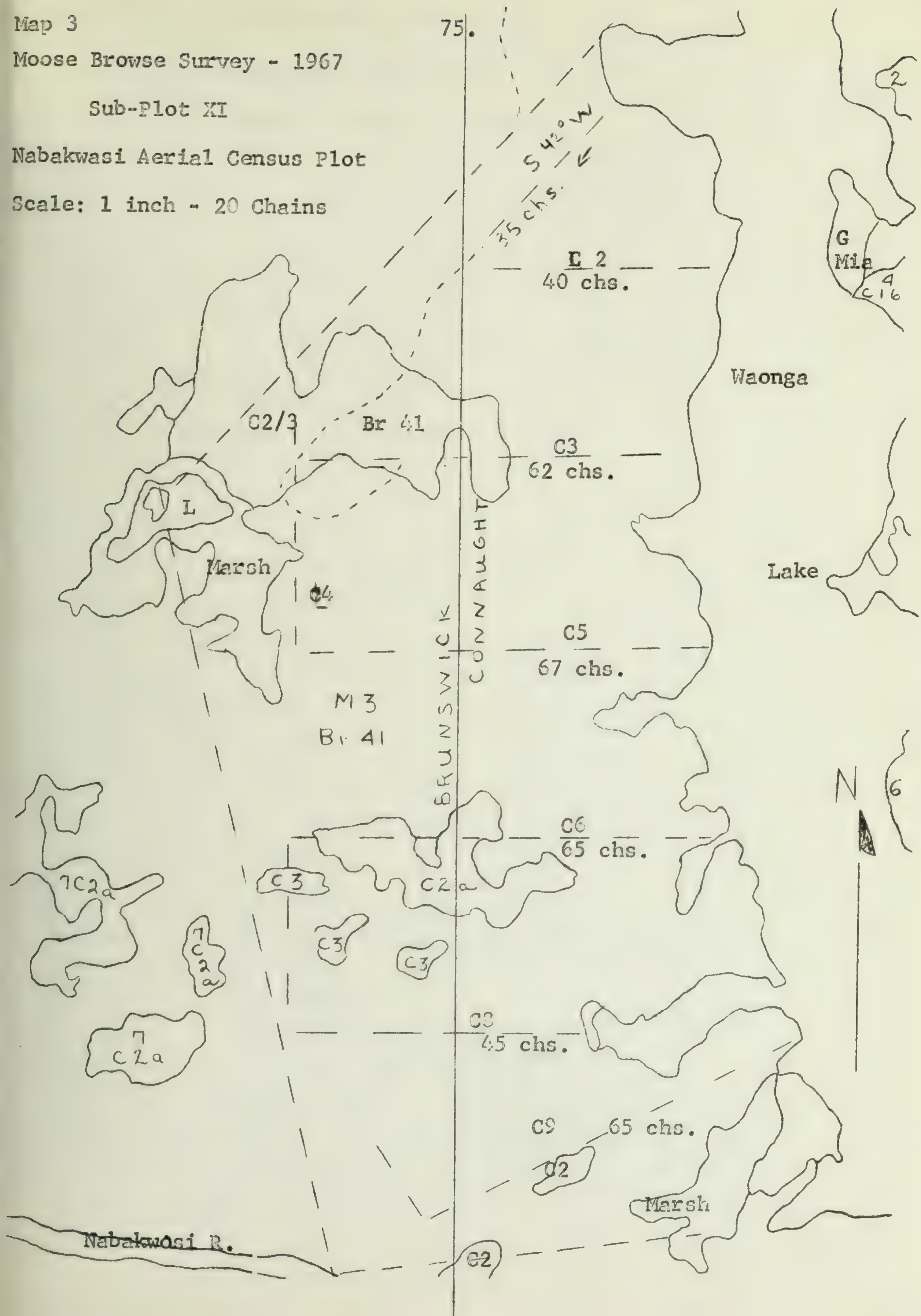
Map 3

Moose Browse Survey - 1967

Sub-Plot XI

Nabakwasi Aerial Census Plot

Scale: 1 inch - 20 Chains



Map 4

Moose Browse Survey Plot

Nabakwasi Moose Census Plot #III

Scale: 1 inch = 20 Chains